

Mining

CONGRESS JOURNAL



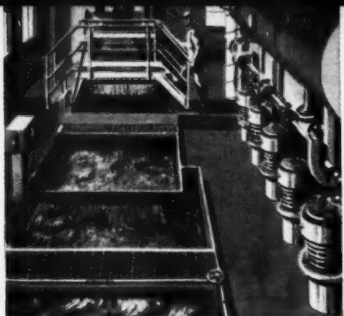
DECEMBER
1952



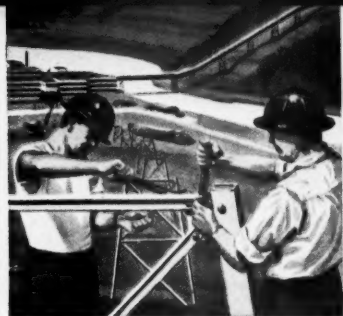
Special Advertising Section



OVERALL ENGINEERING. Vast experience of nation-wide design and field engineering staff integrates all factors, assures expert planning.



QUALITY EQUIPMENT. Link-Belt builds broadest line—you get a range of choice in all items, most warantees from same source.



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SATISFACTORY PERFORMANCE. When you rely on Link-Belt as a single source, Link-Belt accepts responsibility for overall operation.

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Pocahontas Fuel Co. uses Link-Belt cleaning and handling equipment throughout preparation plant at Itmann, W. Va.

LINK-BELT Heavy-Media plant solves Pocahontas' cleaning problem

THE world-famous by-product coal of Pocahontas No. 3 Seam contains impurities in some areas. This cleaning problem was solved at their Itmann mine in Wyoming County, W. Va., by Pocahontas Fuel Co. with a Link-Belt Heavy-Media preparation plant.

Pocahontas Fuel Co. now produces 700 tons per hour of a uniformly high-grade coal from this seam. This is economically possible because Link-Belt Heavy-Media Concentrators separate materials

at a low, economical specific gravity. Five clean, dry, accurate sizes are individually loaded or blended—and refuse disposed of by their Link-Belt engineered plant.

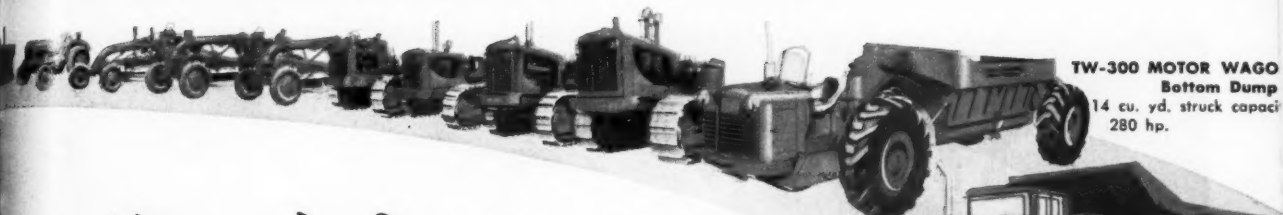
Link-Belt offers you unique advantages as a proved source of total responsibility in building coal preparation plants. Our engineers will be glad to show you how this complete service can help you produce a better product . . . at lower cost per ton.

LINK-BELT

**COAL PREPARATION
and HANDLING EQUIPMENT**

LINK-BELT COMPANY: Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8, Springs (South Africa).

13,024



TW-300 MOTOR WAGON
Bottom Dump
14 cu. yd. struck capacity
280 hp.

TR-200 MOTOR WAGON
Rear Dump
11 cu. yd. struck capacity
176 hp.



TS-200 MOTOR SCRAPER
10 cu. yd. struck capacity
176 hp.



TS-300 MOTOR SCRAPER
14 cu. yd. struck capacity
280 hp.

Now...the famous MOTOR SCRAPER

joins the  line

...the Finest Line on Earth

In order to serve you more completely, Allis-Chalmers has extended the *Finest Line on Earth* by adding the famous MOTOR SCRAPERS and MOTOR WAGONS formerly manufactured by LaPlant-Choate. This customer-accepted line meets A-C's 4-point quality requirements in every way.

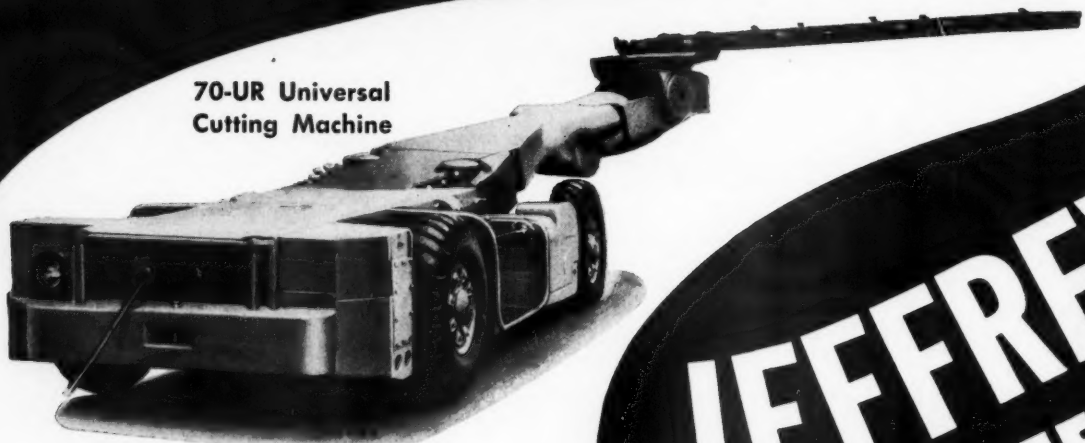
These big self-propelled units are *designed for your job . . .* easy loading, high-speed hauling and quick, clean ejection. They're *built to take it . . .* job-tested, job-proved through years of use all over the world. Like Allis-Chalmers' other earth-moving equipment, the MOTOR SCRAPER is *easy to operate . . . simple to service.*

Today's jobs require a more careful selection of equipment. That's why you'll be money ahead if you make your nearby industrial A-C dealer your headquarters for crawler tractors, motor graders, MOTOR SCRAPERS and MOTOR WAGONS. Stop in soon to discuss your job requirements and see his complete parts and service facilities.

ALLIS-CHALMERS

TRACTOR DIVISION - MILWAUKEE 1, U. S. A.

**70-UR Universal
Cutting Machine**



**29-UC Universal
Cutting Machine**
(Patented)



To meet all the requirements of top, center and bottom cutting as well as shearing *in one machine* Jeffrey offers a complete line of Universal type coal cutters in three mountings: Rubber tired, Crawler, and Track.

These machines are designed for seam heights ranging from three and one-half feet to thirteen feet. They have completely rotating and adjustable cutter bars for making a cut any place in the seam from 11" below floor level to 13 feet above.

They feature the latest developments in coal

cutting efficiency . . . are completely hydraulic in operation . . . are of compact, rugged construction. They will cut large quantities of coal with a minimum of maintenance.

The flexibility, maneuverability and ease of operation make these machines a highly profitable investment both from the standpoint of work accomplished and low cost of operation.

Catalog No. 835 pictures and describes more fully Jeffrey Universal and Arcwall Coal Cutters. Send for it.

70-U Universal Cutting Machine

(Patented)



EQUIPMENT MEETS OF MODERN MINE OPERATION

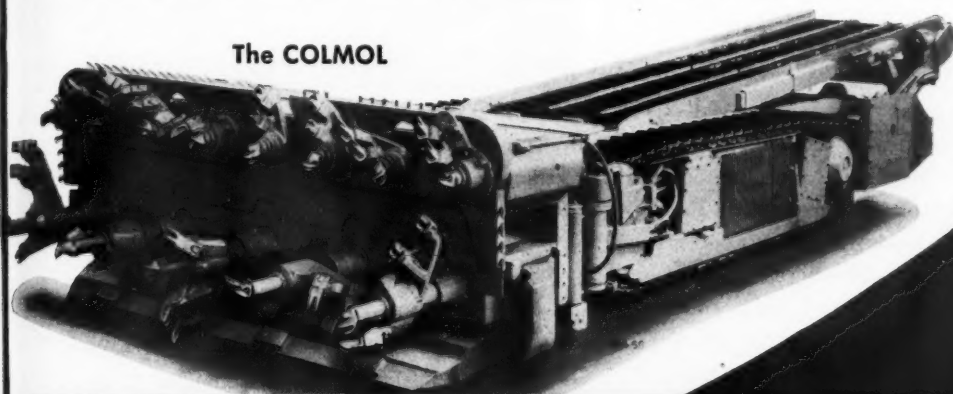


35-B Shortwall Cutter

Jeffrey 35 Series SHORTWALL Coal Cutters were designed to provide an easy-to-handle, powerful, rugged cutting machine capable of cutting coal at high speeds. Simplified operation . . . easy and speedy control from centralized position enables the operator to follow the cutting operation easily. Available in four types with either 35 or 50 HP motor depending upon conditions. They can be furnished with slack handling arrangement if desired. This device provides a cleaner kerf and makes for easy, fast removal of cuttings. Catalog No. 829 gives complete details.

The COLMOL is the latest contribution to mining and forecasts large output, great economy and safety. It introduces an entirely new principle of coal recovery whereby a series of slowly rotating arms with bits break the coal from the solid and sweep the coal loose to the center where it is picked up by a conveyor as the unit advances. Roof, walls and floors are left clean as machine mines and loads the coal in one operation without the use of explosives. The COLMOL is the answer to safe, low-cost continuous mining. Bulletin No. 834 for complete details.

The COLMOL



(Patent Pending)

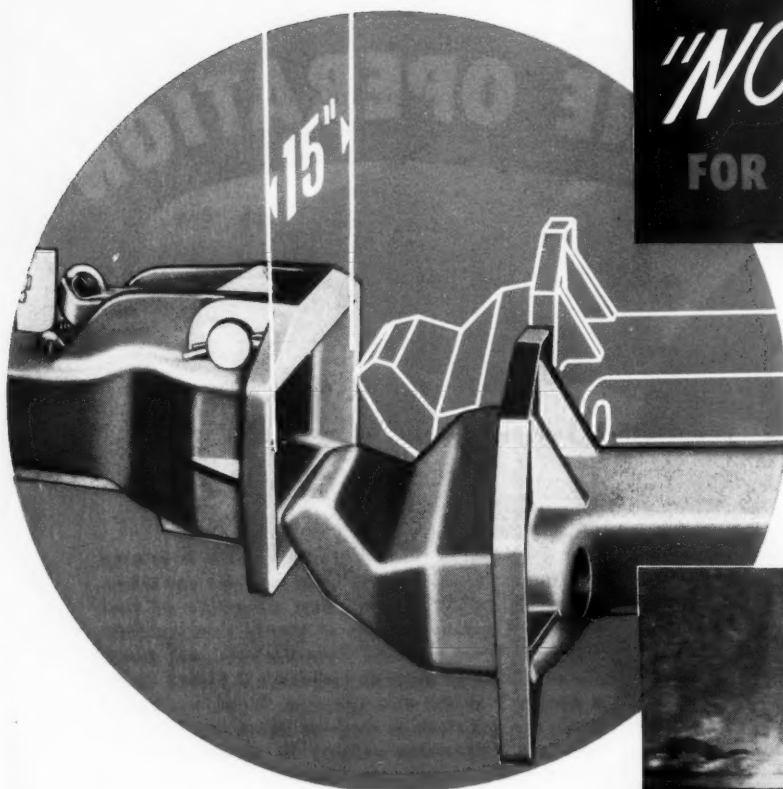
THE JEFFREY

MANUFACTURING COMPANY Established 1877

912 North Fourth St., Columbus 16, Ohio



Baltimore 2	Boston 16	Cincinnati 2	Detroit 13	Houston 2	New York 7	St. Louis 1
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USE
"NO HANDS"
 FOR SAFE COUPLING

Fifteen inch gathering range is one feature which assures automatic operation of the O-B Coupler. Mating heads meet within this range and guide one another as the cars come together. Since the heads seek to center themselves on one another and join securely on impact, car coupling is a "no hands" operation, and workmen keep clear of the between-cars area.

AUTOMATIC OPERATION PROMOTES HAULAGE SAFETY

Every coupling hazard present when joining cars equipped with ordinary couplers can be eliminated with the use of O-B Automatic Mine Car Couplers. Since mating heads of the O-B Coupler guide each other and seat themselves firmly as they come together, there is no need for a worker to help in any way. Thus a "Hands Off" policy is in effect at all times when cars are made up into trips. With such a rule in force, men are not exposed to the between-cars danger area. Ordin-



ary coupling methods, on the contrary, compel a workman to get between cars to guide parts together and lock them in place.

While it's a good idea to teach "Safety First" wherever possible, it's a better idea to remove potential safety hazards wherever possible. Your coupling method may be one of these places. Keep the safety features in O-B Automatic Coupling in mind when you renovate cars or replace them.

Ohio Brass
 MANSFIELD OHIO, U.S.A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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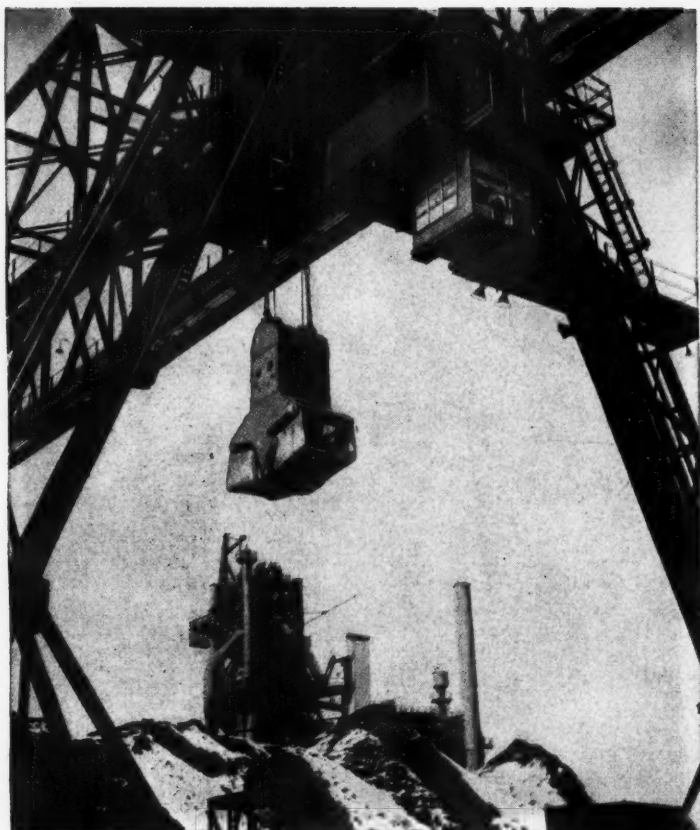
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Heavy Bulk Materials
Handling Equipment
Depend On
Heyl & Patterson
For
Advanced Design
and
Controlled Low Cost**

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The concave shape stays sharp as it wears away. This means:

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8. Less down time
9. Less maintenance on your mining machines

and the DOUBLE POINT DOUBLES YOUR SAVINGS!

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2,217,347

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CUTTING
FACE

PATENTED
CONCAVE
SHAPE STAYS
SHARPER
LONGER

SPECIAL
ALLOY
TOOL
STEEL

HEAT TREATED
TO HARDNESSES
BEST SUITED
TO YOUR
CUTTING
CONDITIONS

SEE-TRY-the new 1-29 Bowdil Bit

The BOWDIL Company
CANTON, OHIO

Gentlemen:

☐ Have your representative see us.

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COMPANY

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CITY..... STATE.....

your continuous mining machine is only
as "**continuous**"
as the cable that powers it!

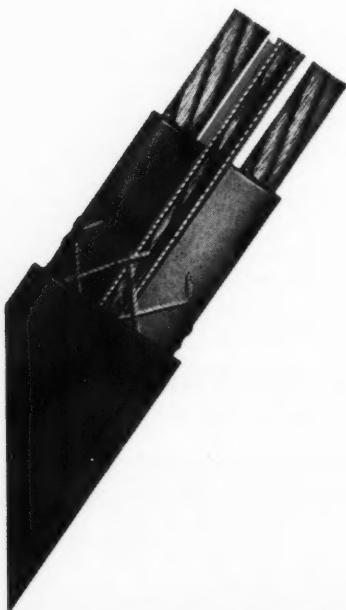


Continuous miners produced over 10 million tons of coal last year—and set a record! But it's expensive equipment to lie idle due to faulty cable. Since there's a big difference in cables, it pays to choose yours carefully.



for longer "break-free" service make sure it's

Cold Rubber Insulated Securityflex



The *only* economical cable is one that can take the toughest job conditions—impact, abrasion, crushing, cutting, heat, and water—and show a consistent record of fewer time-consuming breaks. In this respect Securityflex* is in a class by itself, doubly protected by cold rubber insulation—an Anaconda first—and rugged neoprene jacket. New flat-twin construction won't override, kink, or twist. Patented "anti-short" breaker strip and flat-stranded ground wire offer safety protection to the cable and *safety-first* protection to mine-operating personnel.

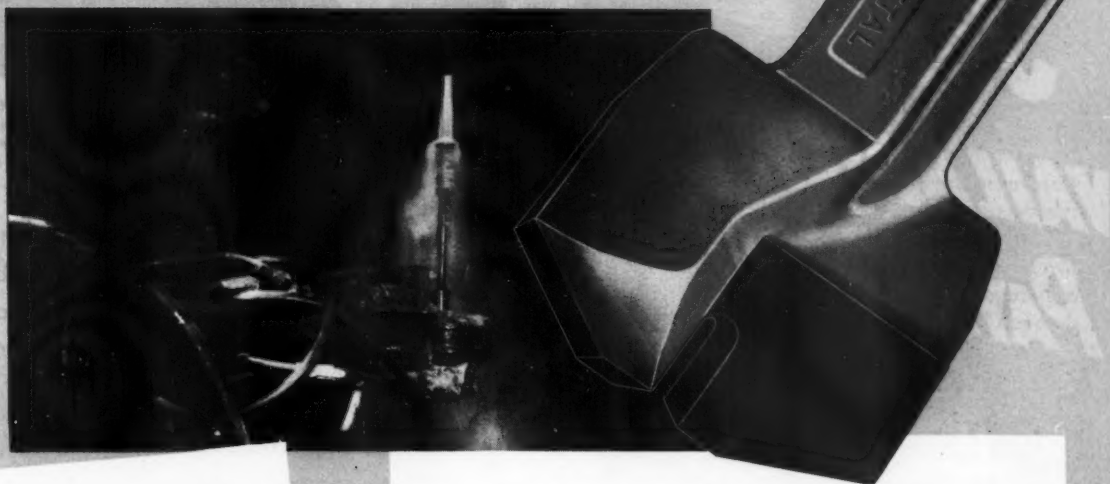
This ANACONDA portable cable stands up well under tension, rides the reel easily, passes smoothly over guides, and won't fatigue readily on frequent sharp bends. Your nearest Anaconda Sales Office or Distributor can demonstrate why this sturdy cable will help boost your tonnage and reduce time out for costly repairs. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

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the right cable for the job **ANACONDA[®]** wire and cable

HOW KENNAMETAL ROOF BITS HELPED

BOOST PRODUCTION 25%



HITCH TIMBERING with KENNAMETAL BITS INCREASES AIR COURSE 20%

Kennametal SD 6½-inch Drill Bits are used in the Nelms Mine to drill for hitch timbering throughout the haulage ways. Four 3½ foot holes are drilled per setup and to date about 4,000 hitch installations have been made. Air course has been opened up about 20%, and safety conditions improved.

SPECIAL SLABBING METHOD GIVES 1/3 MORE RECOVERY

An unusual method of recovery is practiced by the Nelms Mine in bolted areas. Eighteen foot rooms with bolts at three foot centers are driven all the way up, nine feet are slabbled out, and timbering is done as the coal is loaded. Recovery is about 1/3 more than formerly obtained.

The Nelms Mine of the Youghiogheny and Ohio Coal Co. has tried every available make of roof bit in their extensive roof bolting program. Their records show that the Kennametal HFD Rotary Roof Bits now in use consistently deliver the best performance and service.

These tough, Kennametal-tipped bits drill 42" holes in blue slate, shale, and sandrock at rates as high as 20 holes per hour per bit, with the result that roof necks are bolted in 1/4 the time previously needed. By so improving the efficiency of roof bolting, Kennametal Roof Bits are an important factor in the 25% tonnage increase that bolting has made possible in this mine.

Kennametal offers a complete line of bits for cutting and drilling—with tips whose shock and wear-resistant characteristics cannot be matched by any other tungsten-carbide in the coal industry. Kennametal representatives—men with years of actual mining experience—will recommend the right bit for the job, and go into the mine to demonstrate the operation. Call *your* Kennametal representative today!

Kennametal Inc., Mining Tool Div., Bedford, Pa.

KENNAMETAL®



Quality Carbide Of The Coal Industry

*World's Largest Manufacturer of
Tungsten-Carbide Mining Tools*

**IN MINES
and
QUARRIES**

***JOB
AVAILABILITY
PAYS OFF!***



Euclid Bottom-Dump Coal Haulers of 20 to 40 ton capacities have diesel engines to 300 h.p. . . . loaded speeds up to 34.4 m.p.h.

For open pit mining and quarry operations, Euclids are unmatched for job availability and long service life. "Eucs" have large capacity and plenty of power and speed to move more loads per hour at more profit per ton.

Bottom-Dump Euclids are engineered and built as complete units with good weight distribution, and tremendous power. Short wheelbase of the tractor and the universal hitch design make them easy to handle and permit short turns in narrow cuts.

Rear-Dump "Eucs" have body designs for all types of materials—coal, ore, rock, overburden and other heavy excavation. Their rugged construction withstands the impacts of loading heavy materials and travel on rough roads—assures low operating and maintenance costs.

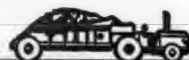
Put Euclids on the job and be on more jobs! Ask your Euclid Distributor for information on the models best suited to your off-the-highway hauling requirements.

The EUCLID ROAD MACHINERY Co.
Cleveland 17, Ohio

Rear-Dump Euclids of 10 to 34 ton capacity have travel speeds to 36.3 m.p.h. with full payload and diesel engines of 125 to 400 h.p.



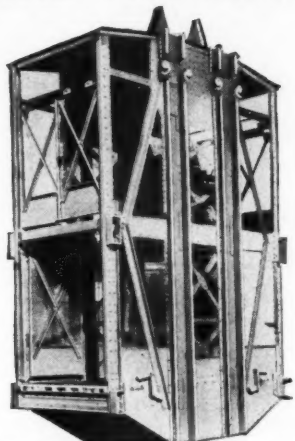
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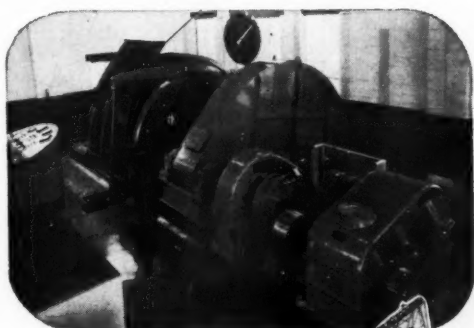
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**IS 80 YEARS OF "SPECIALIZED"
MANUFACTURING OF
RELIABLE MINE
EQUIPMENT**



HOLMES HEAVY-DUTY CAGES in all sizes and types for rapid hoisting and low maintenance. Ask for complete information.



Holmes Advance Design Hoists feature the latest and most complete control equipment. Ask for complete information.

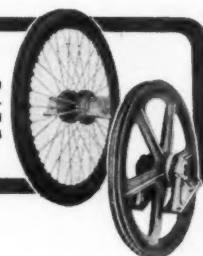
Increased mine production and efficiency—from the pit or shaft to the loading dock—are found today in hundreds of mines because of equipment pioneered by Holmes. Use this specialized experience to obtain the most advanced design, the best of materials and the latest methods of manufacture. Take advantage of this creative engineering and long-standing reputation for sturdy construction that assures efficient, dependable performance at a lower over-all cost. Call on a Holmes Mine Equipment Engineer for consultation in the planning and development of your requirements. There is no obligation.



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Bicycle and Cast spoke types of lightweight yet strong section to avoid undue bearing wear and high inertia. Plain groove or with renewable steel liners both single and double grooved. From the smallest diameter up to 14 feet. With or without shafts and bearings.



Peabody Coal Company's new mine No. 17 at Pana, Illinois, is equipped with Holmes Hoisting Equipment.



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AND RETARDERS



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Over and over again, C-M-I has proved itself to be the last word in centrifugal know-how, engineering and workmanship. Since acquiring all basic patent rights of the original Elmore Dryer over forty years ago, C-M-I has continued to develop the principal of centrifugal drying, producing units that are reaching previously undreamed of peaks of performance and efficiency.

To further serve the Coal Industry, we maintain a complete laboratory to aid in solving individual dewatering problems. We will be very happy to aid you.

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7 out of every 10
are repeat orders

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GRINDING MILLS

OPERATING MEN who have had actual experience with Allis-Chalmers grinding mills will usually specify A-C mills again... as proved by our sales records.

Repeat orders, of course, come only from customers who have been well satisfied. That's why we're proud of the fact that 7 out of 10 new Allis-Chalmers grinding mills go to operators for whom we have supplied mills in the past.

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Principal Cities in
the U. S. A. Distributors
Throughout the World.



Hammermills



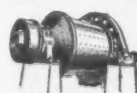
Vibrating Screens



Jaw Crushers



Gyratory Crushers



Grinding Mills

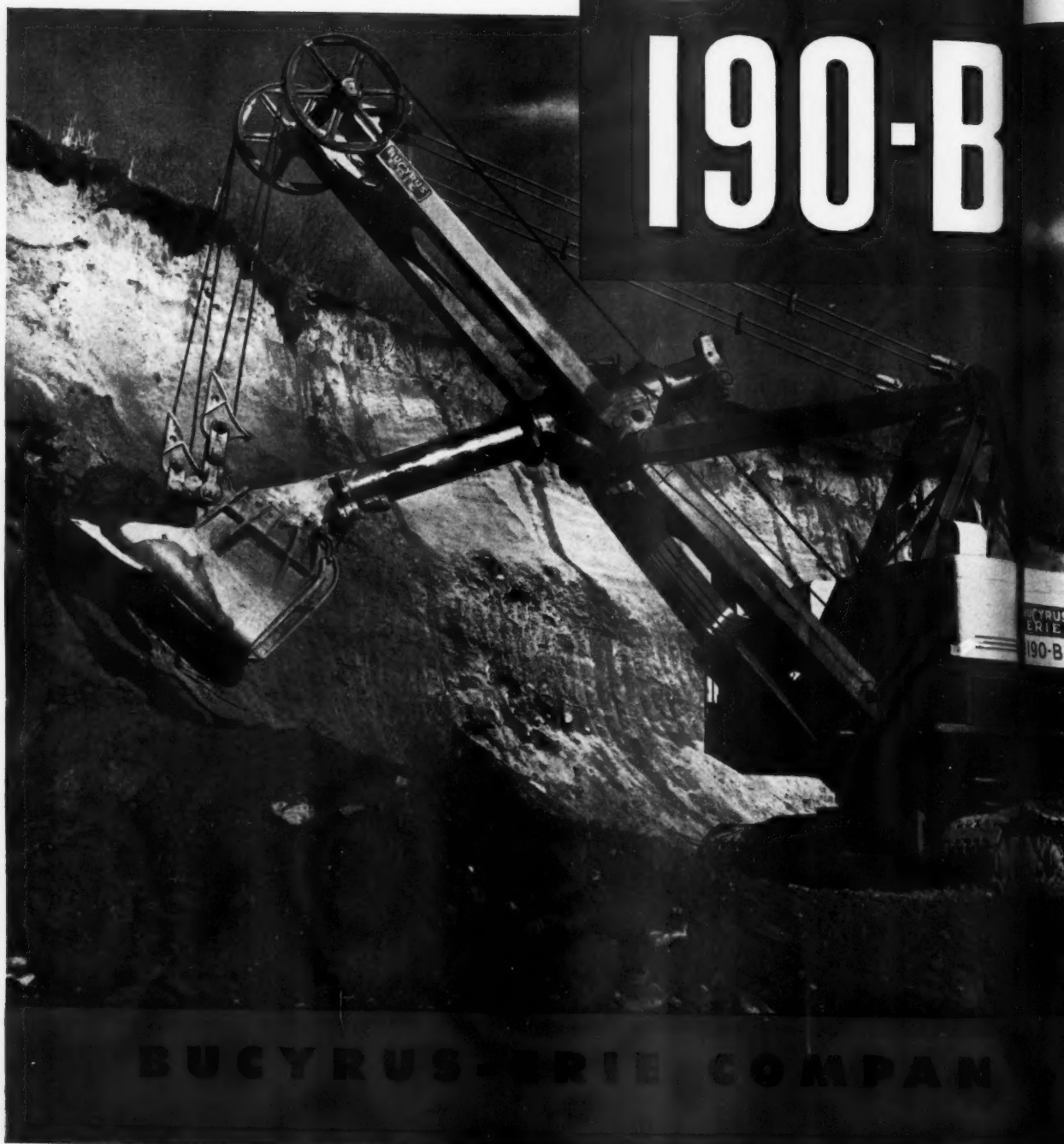


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ERIE**

8-yard


190-B



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ANOTHER SMOOTH, FAST, BIG OUTPUT SHOVEL

for mines and quarries



The new 190-B follows the tradition of Bucyrus-Erie leadership in producing high quality excavators capable of delivering consistently big output at lowest possible cost per cubic yard. This 8-cubic yard shovel and dragline offers you many outstanding features — features that add up to greater capacity, higher output, and faster, smoother, more economical operation. Among these outstanding features are:

EXCLUSIVE TWO-SECTION BOOM

reduces shovel front-end weight, increases swing speed and payload capacity, yet provides ample strength for tough digging.

POWERFUL, MAIN MACHINERY

designed for double twin hoist, delivers power surely, smoothly, efficiently.

LARGER, STRONGER MOUNTING

provides ample strength for heavy duty and protective features for minimizing wear.

The 190-B has full Ward Leonard improved starting control, is readily convertible to dragline service and has numerous other outstanding features to meet the production demands of your toughest jobs.

MILWAUKEE, WISCONSIN



NEW

CRUCIBLE DOUBLE DIAMOND

takes drill steel
out of the
"CROWBAR CLASS"

At last! A drill steel that's not in the "crowbar class" . . . because Crucible's new DOUBLE DIAMOND hollow drill steel is a *tool* steel . . . made by drill steel specialists to tool steel specifications. Its greater fatigue strength means lower cost per foot drilled . . . and saves those *valuable carbide bits*.

Find out first hand about this step forward in drill steel — find out how Crucible DOUBLE DIAMOND in your drilling operation does a better job . . . faster! Write for full details. Do it now!

this Alloy
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has greater
fatigue strength . . .
cuts bit losses . . .
lasts longer

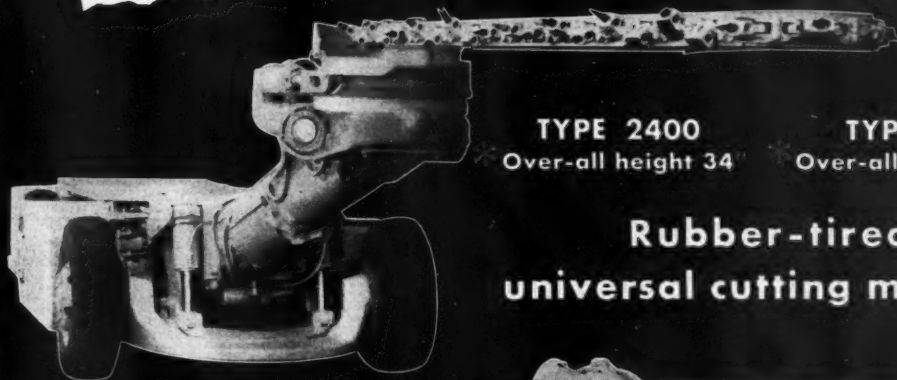
CRUCIBLE first name in special purpose steels

52 years of *Fine* steelmaking

HOLLOW DRILL STEEL

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.
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Over-all height 34'

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Fast cutting, fast tramming machines with the capacity to set the pace for high productive loading units in trackless mining systems.

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* Over-all height same as that of tires used.
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✓ CENTER CUTS
✓ BOTTOM CUTS
✓ SHEARS

No blind spots
from top to bottom,
from rib to rib

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get all the coal out of

AIRDOX CARDOX

NON-EXPLOSIVE MINING METHODS

**Give You Higher
Coal Production
at Less Cost**

The first place to increase your mine profits is right at the working face.

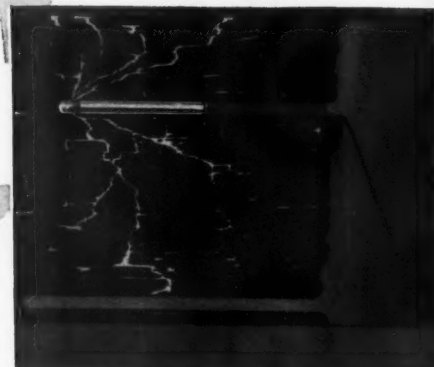
And it's here that Airdox or Cardox can help you get out more coal—faster—and in easier-to-handle form than is possible by other methods. Using the powerful, but smooth, acting force of compressed air or expanding carbon dioxide, they "heave" coal out and roll it forward in loose piles for easy mechanical loading. There's no shattering blast to smash much of the coal into undesirable fines or to raise excessive dust that can cause fires or explosions. Mine roofs aren't shatter-cracked; extra timbering needs are reduced.

With Airdox or Cardox, men and equipment can go to work immediately after coal has been dislodged. Because less fines are produced, the coal is easier to clean and process. Degradation is also minimized.

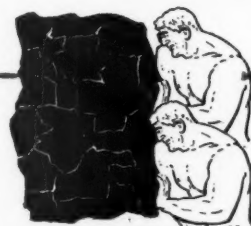
Over a period of years—and in more mines every year—Airdox and Cardox have proven their value. Both are adaptable to almost any mine with practically no change in operation necessary.



A lot of coal profit is often blown to bits—but not with Airdox or Cardox.



Airdox and Cardox dislodge coal gently without producing excessive fines, degradation or damaging the mine roof.



Which Method for You?

Both Airdox and Cardox offer impressive advantages and economies. Which is best for you can be determined after our engineers have studied your mining operation. There's no obligation—ask that one of our men call on you soon.

your mine profitably

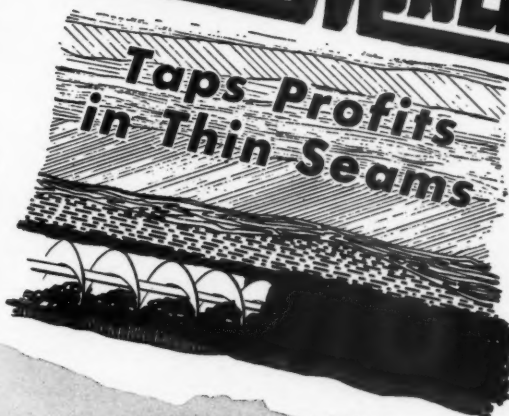
Where thin seams or poor roof conditions make mining by regular methods unprofitable or unsafe, this simple, low cost AugerMiner earns bonus money for you. It takes over where regular methods stop. With little or no added development expense, you can drill out tonnage that otherwise would be lost. The coal produced is cheaper to process because the AugerMiner drills out coal free of impurities from roof or bottom.

The AugerMiner teams with a mechanized conveyor for the ultimate in fast, efficient loading. The AugerMiner can "reach" as far as 100' into a seam for extra coal. Powered by a 25 HP electric motor, it can handle augers to 28" in diameter.

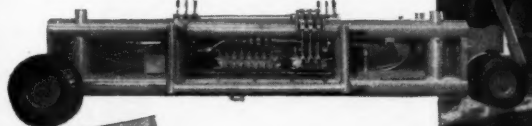
Operators work in safe, easily timbered areas. Coal between holes in the seams provide ample support

for roof in drilling areas. All controls are centralized for speedy operation by minimum crew.

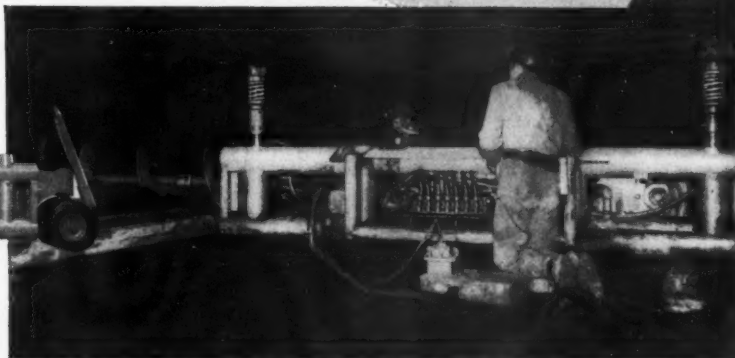
CARDOX-HARDSOCC *Underground* **AUGERMINER**



Removable tramming gear and low overall height makes the AugerMiner easy to move and position.



AugerMiner is fully described in new bulletin. Write for your copy today.



Hydraulic roof and floor jacks lock AugerMiner in place and keep the auger positioned or aligned for directional control.

CARDOX CORPORATION
MINING DIVISION

Boston, Illinois

Camden-on-Deer, W. Va.

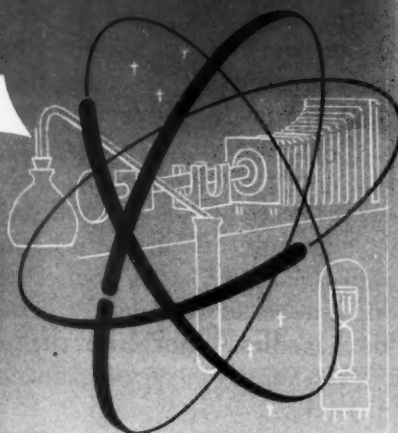
Franklin, Pa.

Harlan, W. Va.

Steel

BULWARK OF FREEDOM AND...

LABORATORY FOR THE
ADVANCEMENT OF QUALITY



**Another Electric Furnace Increases
Sheffield Steel Making Capacity**

At both the Houston and Kansas City Sheffield steel mills, ultra modern electric furnaces supplement the many open hearth furnaces in making Sheffield Steel. Also added to Sheffield's steel making facilities is a new and modern laboratory.

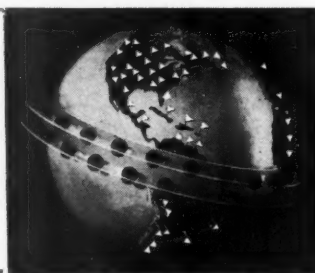
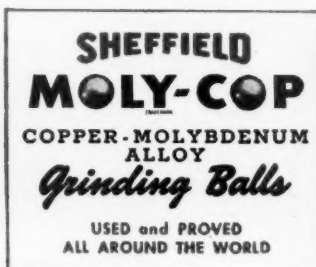
Steel enters into every product. Steel is either a part of the product or is used in its production—or both.

Advancement of quality in many products very often must begin in the steel maker's laboratory.

At Sheffield Steel Mills is the most versatile metallurgical laboratory West of the Mississippi and East of the Rockies. It is complete with chemical and physical equipment. Its technical staff continuously searches for improved formulae for a wide diversity of steels and for better processes of heat treatments under automatic pyrometric control.

Then, from raw materials to finished steel, samples are micro and macro etched and photographed for metallurgical observation of porosity, grain structure and faults. The physical laboratory constantly runs impact, fatigue, tensile and hardness tests including stress-strain diagrams.

And, Sheffield's advancement of quality to higher and higher levels goes beyond this. Inspection data is analyzed at every step of manufacture by statistical methods. Thus statistical quality control quickly points out the slightest variation from the high uniform level prescribed.



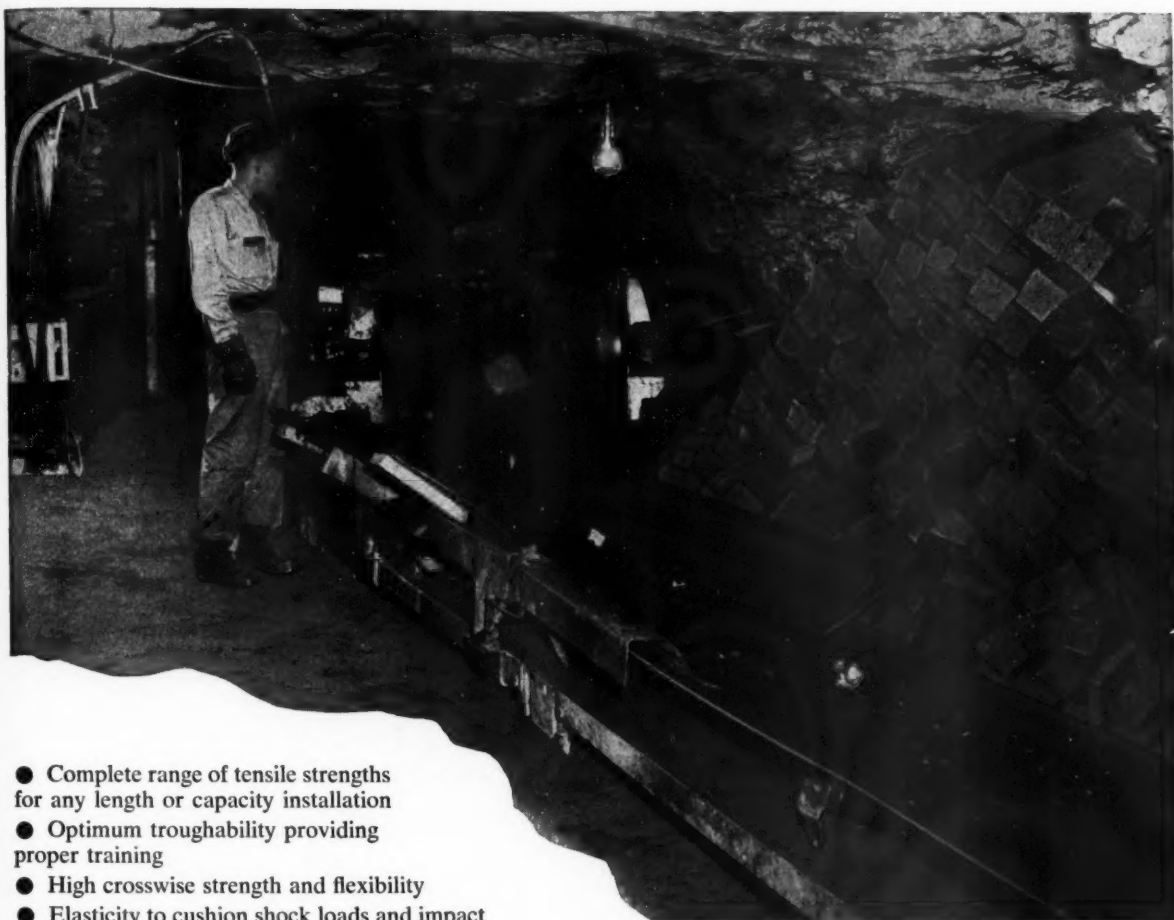
Other SHEFFIELD STEEL Products

Plates, Sheets, Merchant Bars, Steel Joists,
Structural Shapes

Reinforcing Bars, Welded Wire Mesh, Wire
Products, Wire Rods, Fence, Spring Wire,
Nails, Rivets

Grinding Media, Forgings, Track Spikes, Bolt
and Nut Products

What are the outstanding features of U. S. Rubber's Giant Underground Belts?



- Complete range of tensile strengths for any length or capacity installation
- Optimum troughability providing proper training
- High crosswise strength and flexibility
- Elasticity to cushion shock loads and impact
- Exceptional fastener holding ability
- High quality rubber covers to withstand abrasion, cutting and gouging
- Skim between all plies for increased flex life over small underground pulleys
- Resistance to acid mine waters
- Mildew inhibited carcass

U.S. Giant Underground Belts are obtainable at your nearest U.S. Rubber Mechanical Goods distributor or "U.S." factory branch.

TRANSFER POINT between two 30" 4 ply Style XN U.S. Giant Conveyor Belts. Style XN is a patented construction of cotton and Nylon carcass embodying greater strength and crosswise flexibility at no increase in weight over conventional type belts. More than 15,000 ft. of this belting is operating in this mine.

PRODUCT OF

U.S. RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY
MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

THE IMPROVED Exide-Ironclad BATTERY

GIVES you more . . . SAVES you more

It gives you more of everything that adds up to top performance, long battery life . . . saves you more through low over-all costs. Outstanding new features, including the polyethylene insulating tube sealer, *more than ever before*, make Exide-Ironclad YOUR BEST POWER BUY . . . AT ANY PRICE.

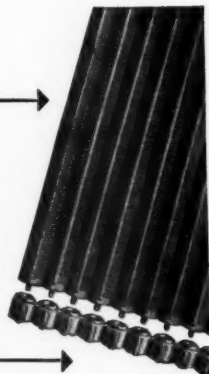
HERE'S WHAT YOU GET

Rapid, high production haulage, more trips per shift . . . High maintained voltage, with uniform speed to end of shift . . . High availability . . . Low operating costs . . . Low maintenance costs . . . Low depreciation costs . . . Safety from hazards of fire and fumes.

AND HERE'S WHY

IMPROVED POSITIVE PLATE CONSTRUCTION. The long-life grids now contain SILVIUM—an alloy of silver, lead and other components—which makes them highly corrosion-resistant.

NEW POLYETHYLENE INSULATING TUBE SEALER of acid-proof, non-corroding plastic. It fits snugly into slotted tubes of positive plates, and reduces loss of active material. Even the small sediment deposit of the past is reduced 50%. Thus more active material remains available, and the high battery capacity is maintained for a longer working life.



PLUS THESE EXTRAS

IMPROVED NEGATIVE PLATES for higher electrical efficiency.

NEW SEALING COMPOUND provides permanent seal between jar and cover.

SEAMLESS SHOCK-PROOF JAR, of high-quality rubber. A scientifically selected combination of tensile strength and elongation provides a sturdy jar built for long-life and heavy-duty service.

NEW UNBREAKABLE PLASTIC VENT PLUGS of polyethylene.

TYPES, SIZES AND CAPACITIES for battery-electric mine haulage units of every make.

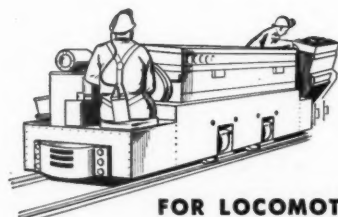
THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2

Exide Batteries of Canada, Limited, Toronto

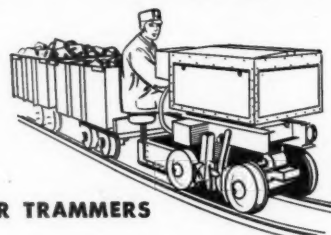
1888

DEPENDABLE BATTERIES FOR 64 YEARS

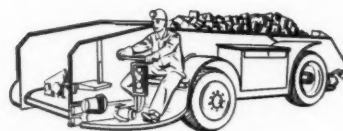
1952



FOR LOCOMOTIVES



FOR TRAMMERS



FOR SHUTTLE CARS

Exide-Ironclad

IS YOUR BEST POWER BUY
. . . AT ANY PRICE

POWER



"EXIDE-IRONCLAD" and
"SILVIUM" Reg. T.M. U.S. Pat. Off.

HOW TO GRIND CARSET JACKBITS

Proper periodic regrinding of Carset Jackbits prevents wear, the inevitable consequence of normal drilling activities, and saves time on drill change and maintenance. The photos you will find on this chart show regrinding steps and give you the "how to" grinding.

WHEEL RECOMMENDATIONS

Ingersoll-Rand
A Babbcock & Wilcox Co. Inc.

IMPORTANT THINGS TO WATCH

When Threading Ingersoll-Rand 100 Series Jackrods

TO MAKE GOOD RODS GAUGES MUST BE USED

SOME HELPFUL HINTS

MAINTENANCE SUGGESTIONS

Ingersoll-Rand

HOW TO GET THE MOST OUT OF YOUR CARSET JACKBITS

Ingersoll-Rand

ROLLING THE UNDERCUT ON "100 SERIES" JACKRODS

With the Ingersoll-Rand "JACKROLL"

For Increased Attachment Strength

Ingersoll-Rand



Get more* out of your CARSET JACKBITS by using these *free* WALL CHARTS

* To get maximum drilling speed and longest bit life you should use Ingersoll-Rand Carset Jackbits as indicated on these charts.

■ Nothing will make a shift easier or help you get in a better round quicker than fast-drilling Carset Jackbits. To help you make sure that your Carset Jackbits are used to best advantage, Ingersoll-Rand has prepared these four large, easily read charts for your bit-shop wall or bulletin board. They give simple illustrated directions for using and servicing Carset Jackbits and threading 100 Series Jackrods. You'll find these charts a big help in showing your drilling crews and shop personnel how to get the most out of longer-lasting, faster-drilling Ingersoll-Rand Carset Jackbits. To get your free copies, call your nearest Carset Jackbit supplier or fill out and return the coupon.

Ingersoll-Rand

Rock Drill Dept., 11 Broadway, New York 4, N. Y.

784-15

Please send me, free of charge, the wall charts checked below:

☐ Grinding Carset Jackbits, Form 4121

☐ Using Carset Jackbits, Form 4122

☐ Threading Jackrods, Form 4112

☐ Rolling the Undercut, Form 4120

Name

Company

Address

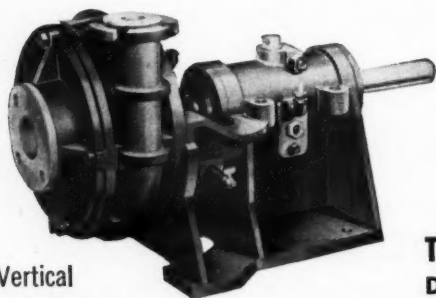
City

How we know what Hydroseals will do for you



Engineering and guesswork don't get along very well together—at least, not for long. To keep guesswork out of Hydroseal engineering, we've kept complete performance records on almost every pump we've sold. These records contain a description of the pump, its operating conditions, power requirements and all repair parts

ordered. Naturally, almost every conceivable pumping condition is included, and the biographies cover a span of years. In most cases, users have found that Hydroseals have paid for themselves in less than a year in power savings alone, with lowered maintenance costs an additional bonus. If you'd like to know what a Hydroseal will do under *your* specific conditions, write us.



Vertical
pumps, too

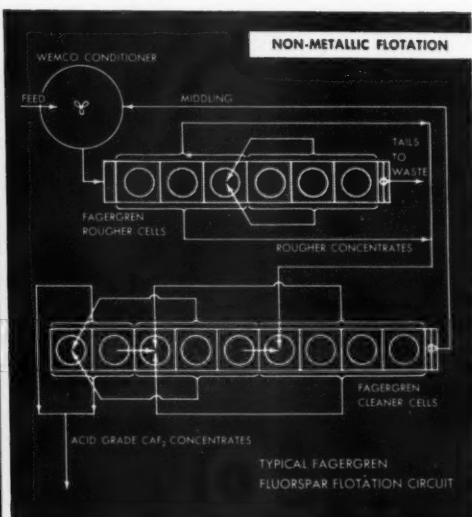
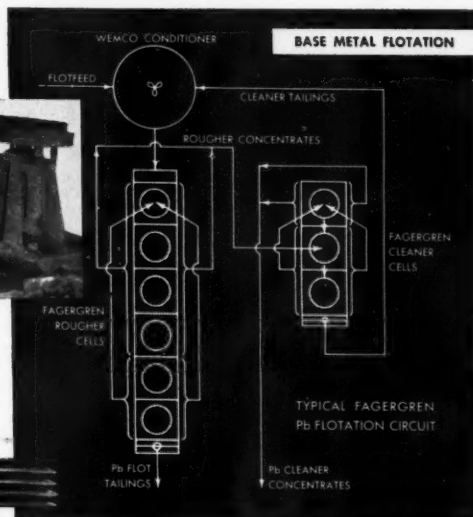
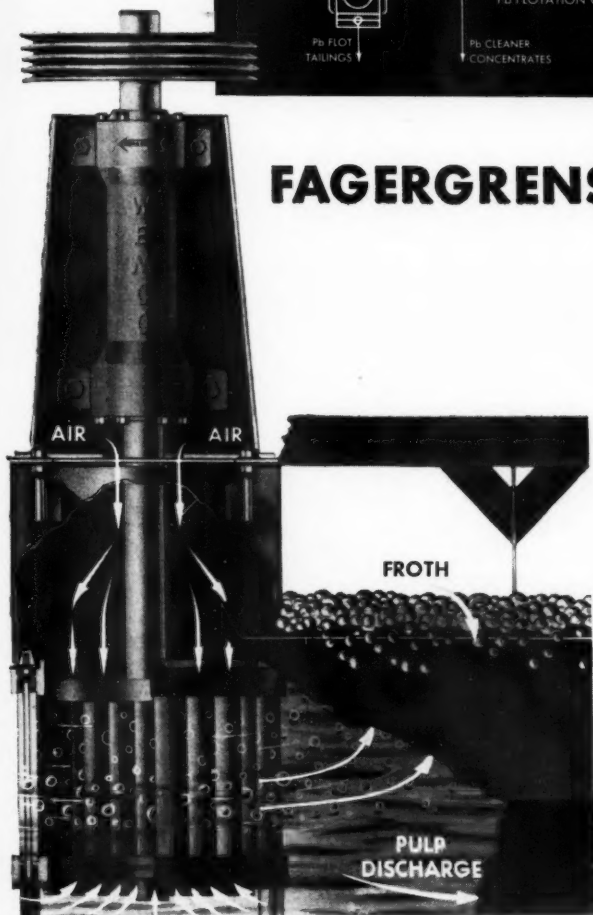
**Ask for
Catalog No. 552**

THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. K—259 E. Lancaster Ave., Wynnewood, Pa.
Representatives throughout the World

HYDROSEAL SAND, SLURRY & DREDGE PUMPS MAXIMIX RUBBER PROTECTED

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

These Flotation Flowsheets prove it!



FAGERGRENS give greater flexibility of cell arrangement!

These typical flowplans demonstrate the outstanding features of WEMCO's Fagergren Flotation machine: flexibility of cell arrangement. Fagergren cells are arranged for product transfer by gravity flow, on one floor level and **without the use of auxiliary pump-ing equipment.**

In medium size and small circuits, Fagergrens provide high metallurgical efficiency in cleaner, recleaner and rougher operations by recirculation of flotation products. This efficiency and the unequaled flexibility of cell arrangement give you these seven advantages:

- low installation cost
- low operating cost
- high metallurgical efficiency
- large capacity
- minimum attendance
- minimum maintenance
- low reagent cost

Write today for further information on how Fagergren flexibility can improve **your** flotation results.

OTHER WEMCO PRODUCTS

Mobil-Mills • Coal Spirals • HMS Thickeners
HMS Pumps • Densifiers • Cone Separators
Drum Separators • Fagergren Laboratory Units
Fagergren & Steffensen Flotation Machines
Hydroseparators • HMS Laboratory Units
Dewatering Spirals • Agitators • S-H Classifiers
Thickeners • Sand Pumps • Conditioners



GARDNER-DENVER

automatic feed drifters

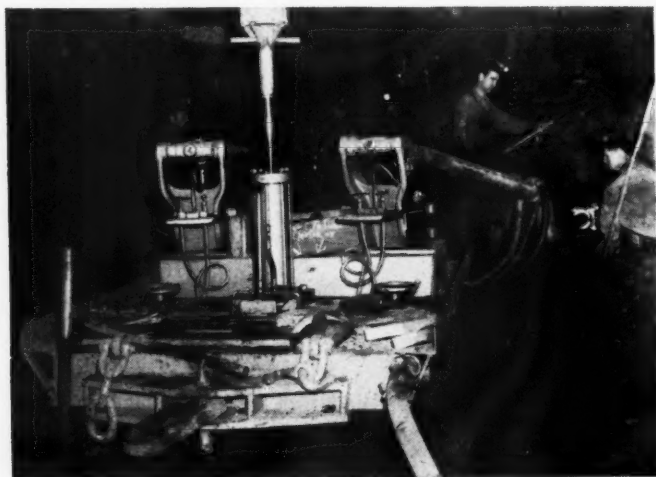
- Low vibration simplifies set-up.
- Self-adjusting feed maintains high drilling speed.
- Powerful rotation handles tight steel, saves lost holes.
- Convenient controls boost drill runner's efficiency.
- Long feed guide shells for fewer steel changes.



DRIVE HEADINGS FASTER with this

GARDNER-DENVER hydraulic drill jumbos

- Faster set-up—move in and start drilling.
 - Long feeds—up to 10 feet—give more actual drilling time per shift.
 - “Creep-free” booms—maintain steel alignment.
 - Offset booms spot lifters easily.
 - Faster tearing down—release hydraulic pressure and back away.
- Write today for full details.



DOUBLE PUNCH!



SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd.,
Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

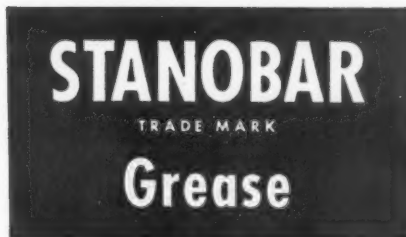


Big lift for maintenance men...

● With its hundreds of belt idler bearings, this large coal conveyor at a mid-west surface mine could have presented significant lubrication and maintenance problems. That's why mine officials, acting upon the suggestion of a Standard lubrication specialist, switched to STANOBAR Grease No. 2.

STANOBAR has dispensed easily from grease guns, thus providing a big lift for maintenance men. This has served to keep time and labor for applying lubricant at a minimum. There has been no trouble from hardening or caking of the grease in the bearings, nor has leakage been a problem. Effective lubrication has prevented any bearing failures due to excessive wear and has kept power requirements for starting and moving the conveyor belt at a minimum.

Operators of this mine have found STANOBAR entirely suited for bearing lubrication in other tippie equipment,



such as shaker screens. This versatility has helped simplify lubrication from both stocking and application standpoints.

The experience of this mine points to savings you can make through Standard's lubrication engineering service and high quality products. How you can get this lubrication service, quickly and easily, is explained at the right. Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?



H. Dillingham, of Standard Oil's Evansville, Indiana, office, is the Standard lubrication specialist who worked with this mine to find the right grease for a tough job. As a result of his work, the mine was able to save time and expense for the maintenance of a coal conveyor.

His on-the-job service is typical of that available to all mid-west mines through a corps of such lubrication specialists. You can be sure that the specialist in your own area has both the practical experience and the training in a Standard Oil Lubrication Engineering School that will result in dependable, thorough assistance. To reach him, all you need do is phone your local Standard Oil Company Office. When he calls, be sure to discuss with him the benefits offered you by such products as:

STANOIL Industrial Oils—Simplify your lubrication jobs by using this one line of oils that provides cleaner operation of loader and crane hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems.

SUPERIA Mine Lubricants—These new, improved oils and greases provide better lubrication of cutters, loaders, locomotives, mine cars, and other underground equipment. They eliminate transmission-case deposits, reduce clutch-plate gumming, and minimize wear on gears and bearings.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.



STANDARD OIL COMPANY

(Indiana)

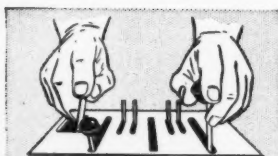
Owners and operators agree, K-370 with Speed-o-Matic Control is

mighty fine for stripping!



CLARENCE LEWIS COAL CO., Manchester, Ky., remove up to 30 ft. of clay, shale and sandstone overburden, then dig coal with a Link-Belt Speeder K-370 high-lift stripping shovel. Owner Clarence Lewis reports he bought the rig on the performance and economy of a K-360 he previously owned. Operator William Ramsey says, "For my money, the K-370 is the best machine made."

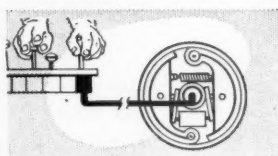
These Link-Belt Speeder PLUS FEATURES increase production, cut costs



Speed-o-Matic Controls — fully hydraulic! You "feel" the load all the way. Simple, easy—fingers instead of muscles do work.



Eliminates up to 150 parts — cuts friction, no worn bushings, pins, links or clutch toggles to put you "down."



Speed-o-Matic Clutch, hydraulically actuated, simple, smoothly responsive. Runs cool. Eliminates need for frequent adjustments.



Service—fast, efficient. Link-Belt Speeder Service is nationwide—near you with replacement parts, factory-trained mechanics. 18,034

LINK-BELT SPEEDER

CORPORATION

Builders of the most complete line of shovels, cranes and draglines

CEDAR RAPIDS, IOWA

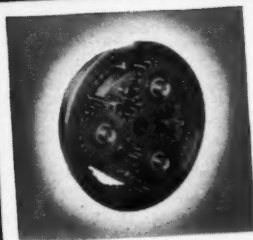
NEW way to step up hauling . . .

STERLING-WHITE 22-TON

PLAN-A-POWER ROCK MOVER

IT'S NEW! It's rugged and tough!
And it's built right to *your* needs.

The famous Super-Traction Differential reduces wheel spinning and bogging down . . . greatly increases tire life. Every feature right for more work . . . more power . . . lower operating cost.



Get More Work Done with Sterling-White Plan-a-Power

Wheel spinning and slippage reduced to a minimum. Job-engineered super-traction differential divides power to each rear axle exactly as road and load conditions demand. Plan-a-Power rugged design has plenty of traction and power to **MOVE** and to **LAST!**

Engineered for the Exact Needs of the MINING INDUSTRY

- 22 ton payload, 15 cu. yd. capacity • 300 H.P. supercharged diesel engine • Ten-speed transmission, wide ratio range • Sterling-White Plan-a-Power rear axle. Single reduction carrier with final reduction in wheel hubs through tri-planet gears • Hydraulic power steering gear, short wheelbase, for outstanding maneuverability, ease of operation
- Offset cab, extra wide, all-steel and rugged

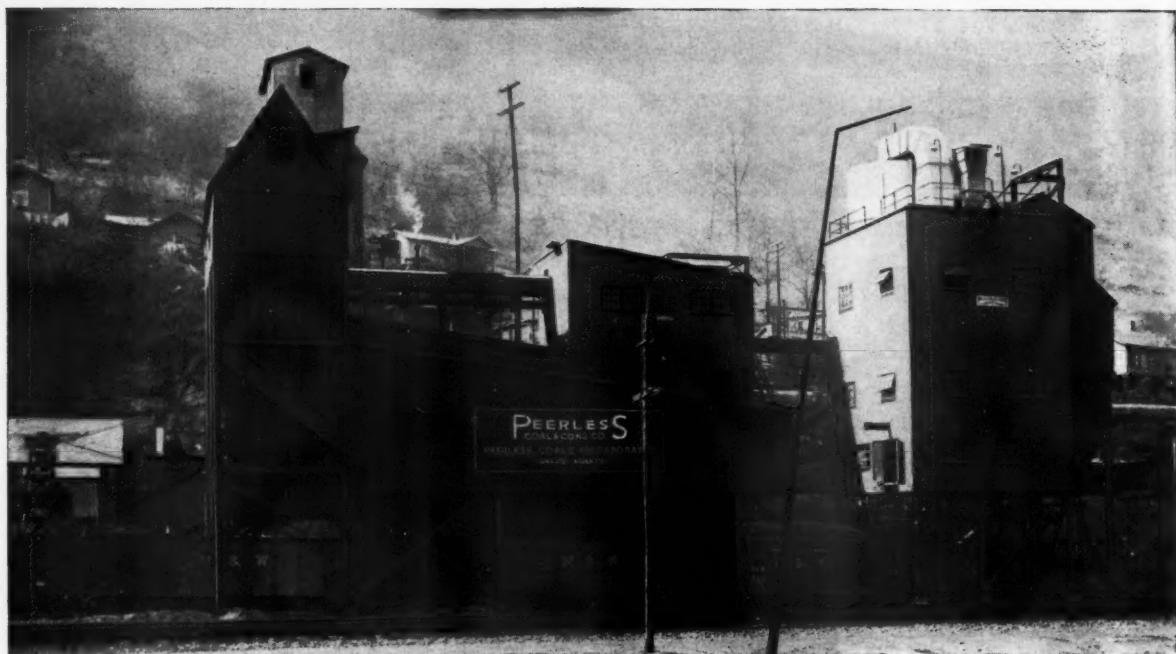


STERLING DIVISION

The White Motor Company • Milwaukee 1, Wisconsin

Export Dept.—Cleveland 1, Ohio, U.S.A. • The White Motor Company of Canada—Montreal

See Your Nearest STERLING-WHITE Representative



Recently completed addition to Peerless Coal and Coke Company plant, Vivian, West Virginia. Engineered and constructed by Roberts & Schaefer Company.

R & S COMPLETES "Operation Modernization" AT PEERLESS

Completion of the new plant addition shown here is the latest step in the "Operation Modernization" that began at Peerless Coal & Coke Company twenty-five years ago.

This latest R&S-engineered addition is built around R&S Super-Airflow units designed to air-wash fine coals. Thus, it complements the original R&S-engineered plant and other R&S-engineered additions which have done a highly successful job of wet-washing larger sizes.

With this installation, Peerless joins with other progressive operators who have accepted the Roberts & Schaefer Co. system of combination water- and air-washing plants. The annual installed capacity of Roberts & Schaefer Hydro-Separators and Airflows now totals 50,000,000 tons.

Whether wet-washing or air-washing is the answer to your preparation problem—or whether the answer is heavy-media separation or some other process—you are assured of authoritative, unbiased counsel when you consult Roberts & Schaefer Company.

An ever growing list of repeat customers like Peerless is your assurance of complete satisfaction.

FIRE!

Mr. Frank Mueller, President
Roberts & Schaefer Company
130 North Wells Street
Chicago 6, Illinois

Dear Mr. Mueller:

We wish to express to you and your company our appreciation for your very prompt and efficient assistance in helping us get back into production after our disastrous tipple fire July 26. Although our slack and stoker coal screening facilities were completely destroyed, we were able to completely install new permanent facilities so as to be in complete operation on August 20. Through your cooperation, we actually lost only 3 full days of operation. Your representative was on the job the day after the fire and your construction crews were working the next day. The ingenuity and diligence of your engineering and construction representatives and crews made possible this remarkable recovery record.

Our thanks to you, Mr. R. G. Miller, Mr. Jack Clark and your crews for making this fine record possible.

PEERLESS COAL & COKE COMPANY
Roland C. Luther
Executive Vice President.

ROBERTS & SCHAEFER COMPANY

130 North Wells Street, Chicago 6, Illinois

1315 Henry W. Oliver Bldg.
PITTSBURGH 22, PA.

P. O. Box 570
HUNTINGTON 10, W. VA.

254 West 54th Street
NEW YORK 19, N. Y.

FOREIGN DEPT.: International Mfg. & Equipment Co., Inc., 220 Broadway, New York 38, N.Y., U.S.A.



✻ Editorials ✻

JOHN C. FOX, *Editor*

DECEMBER, 1952

Past, Present and Future

DECEMBER, 1952—and another year has marched past the reviewing stand of time. During the last twelve months the parade has passed many important milestones for the American people. Chief among these was the recent election. More Americans than ever before took seriously their franchise to vote. By unseating the party which has held almost undisputed sway for 20 years they reaffirmed the two-party system. This is as much a part of our form of government as anything expressly written into the Constitution.

Another important event was publication of the report of the President's Materials Policy Commission. This ponderous document is of major significance in pointing up our needs for adequate supplies of mineral raw materials. Some of its premises and the means it suggests for achieving a balance between supply and demand, are highly controversial. Much has been heard about the Commission's forecasts and proposals—much more will be heard of them in the months to come.

The Korean war drags on and the situation appears to be just about where it was at this time last year. Then, there was hope that the truce talks in progress would bring a halt to hostilities. Events proved the hope ill-founded. Now, President-elect Eisenhower is returning from a personal inspection tour in Korea, and hope for an effective solution again looms on the horizon. Meanwhile the mineral industry is committed to supply the raw materials to assist in rearming the Free World, and to maintain our economy here at home.

Rising costs make this task increasingly difficult. Largest part of the cost of any commodity or manufactured article is the cost of labor. We have lived through a crippling steel strike. Settlement of that strike produced the biggest jump in wage scales in the industry's history. Close upon the heels of this strike came the new coal agreements calling for wage boosts exceeding those granted to the steel workers. Wage boosts which again pierced the ceilings set to control inflation.

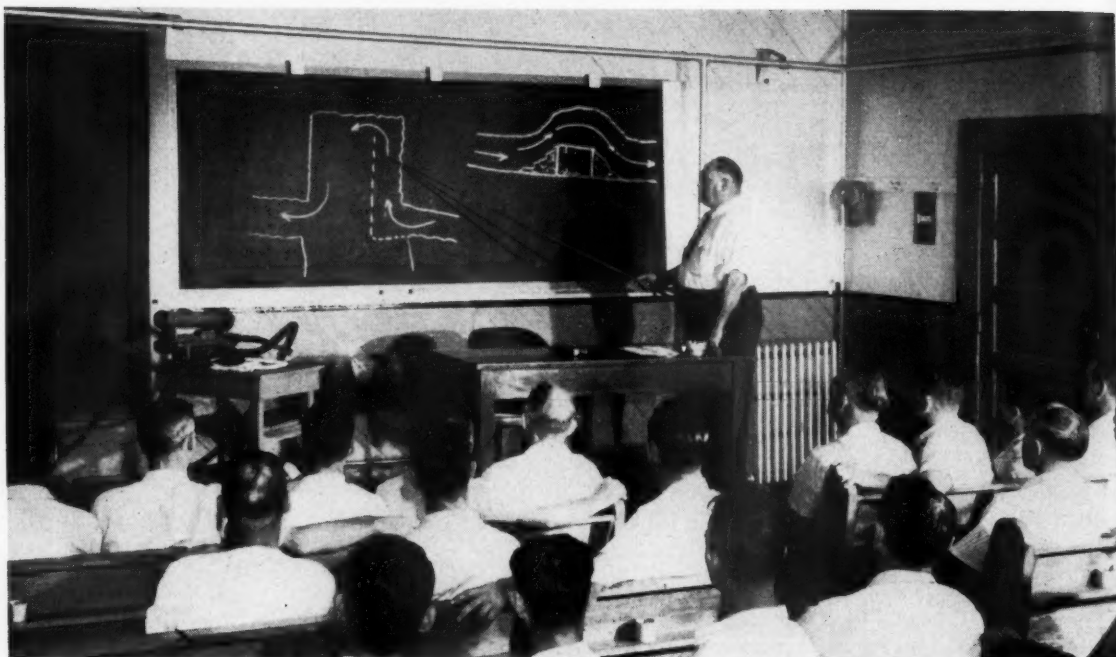
The Wage Stabilization Board refused to validate these contracts. On December 3 President Truman, overriding the board's recommendations, approved the full \$1.90 daily wage increase for the coal miners. By this action he emasculated the WSB and made wage controls "an empty shell and a fraud upon the people." All industry members of the board and its chairman, a public member, immediately resigned in protest. In resigning, the industry members took the position that "there no longer exists the equality with which all law and all regulation should be applied in a republic." The way has been left open for embarkation on a new round of the destructive inflationary spiral.

But some way must be found to halt this giddy climb if the solvency of the United States is to be saved. At the present time, and as far ahead as we can see, the fate of the free world depends on the soundness of our economy. Extravagant Government spending for nonessentials and waste, on top of huge, necessary defense expenditures and ever higher labor cost, has set the pattern for the inflationary period in which we find ourselves. The most important task facing the new administration, then, will be to find a way out of the present economic bedlam.

The way will not be easy. To lead the country to the goals of a balanced budget; a sound currency; restoration of private initiative to invest, will require wisest generalship and the complete cooperation of business—big and small.

Every segment of our economy has a vital stake in the struggle ahead. What must be done transcends political partyism, crosses over the boundaries of economic and social distinctions. This is a battle for the survival of the American way of life and calls for a return to the principles of the Declaration of Independence and to Government according to the Constitution.

This is the crossroads at which we find ourselves as the old year ends. Let all Americans resolve to do their duty as men and women and as citizens of the United States of America.



At regular supervisory training meetings operations, safety, industrial relations and management are stressed

Methods of Training For Mobile Operations*

Safe, Efficient Face Crews Are Turned Out By Teams of Specially Trained Instructors

By **JAMES E. NEASON** and **WALTER H. FLEMING**

Superintendent, Concord Mine

Supervisor of Training, Coal Mines

Tennessee Coal and Iron Division
United States Steel Co.

THE introduction of large and expensive pieces of mobile equipment has made coal mining a very complex operation. To justify the large expenditures for modern coal mining equipment, tonnages for which equipment is designed must be produced while operative and maintenance costs are held at a minimum consistent with safety of personnel and preservation of property. A well rounded and complete training program is necessary to maintain production quotas, to effect economy of operation, and to retain a good safety record. The training program must be balanced to offer instruction in all phases of coal

mining. It must be flexible to meet changing needs smoothly. The aim of the training program at Tennessee Coal and Iron is to present the foreman with the information and knowledge he needs, and to develop his ability to give top quality instruction to men under his supervision.

TCI's training program is centered around weekly supervisory meetings held at each mine. This continuing program of training was started in 1949. It is not a packaged course, although several packaged courses have been included along with subjects prepared at both staff and mine levels. Meetings are mostly of the conference type, led by local mine personnel. Selected supervisors from each mine, with mining "know how," have been

fortified with instructor "know how" by attending a special Instructor Guidance Training Course. In such courses they learn to use training aids, to conduct demonstrations and how to keep conference type meetings under control. Various staff representatives also present specialized topics regularly at the meetings.

Subject matter covered includes operating procedures, operation and maintenance of equipment, cost and production, industrial relations, basic management and rules and laws pertaining to mining. Safety is not merely an accessory. It is an integral part of all phases of training, just as it is in actual mining operations. Some of the packaged courses that have been presented are: Job Instruction Training; Job Relation Training; Job Methods Training, and two National Safety Council sound-slide film courses—"Speaking of Safety" and "Human Factors of Safety."

In addition to the regularly scheduled training program, other courses and programs are presented to meet special needs. Some of these are: the Instructor Guidance Course mentioned earlier; a course for newly appointed supervisors to acquaint them with their duties and responsibilities; and courses which have been conducted to qualify instructors to teach first aid, Job Instruction Training, Job Relation Training and job breakdowns. Familiarization courses are given be-

* Presented at the Annual Meeting of Safety Representatives of U. S. Steel Co., Chicago, Ill., October 20, 1952.

fore new equipment is put into operation.

To date the most elaborate venture is the development of the training method used in connection with the expansion of Concord Mine.

Development work at Concord Mine began in 1946. Earliest development work underground consisted primarily of connecting the intake and return air openings, developing the bottom layout and advancing main headings to obtain sufficient working room.

Development work was continued until 1950, when a sufficient area had been opened to permit the addition of new working sections. Preparation facilities had been completed, making it desirable to add new producing sections in order that the mine production might be increased to meet the capacity of the preparation plant.

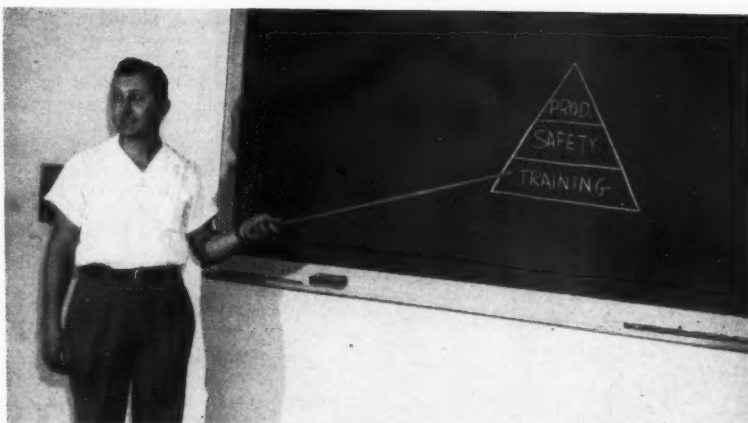
Rapid expansion required to obtain desired production necessitated employment of a large number of men to complement these new producing sections. It was realized that some of the men employed would be totally inexperienced in underground mechanical coal mining. Others would be men whose mining experience had been gained at other companies where different types of equipment had been used and varying mining methods practiced. This sudden influx of a large number of untrained and comparatively inexperienced men would undoubtedly result in a deterioration of safety conditions unless a thoroughly planned system of safety and mining training was inaugurated.

Adopt Team Training Method

The training team method of training new employees, used previously at the company's ore mines with a large measure of success, was adopted for use at Concord because it lent itself well to the training of new men for mechanical mining.

In organizing a team to train new employees, it was necessary to select men with considerable experience who could demonstrate and teach the safe use of mechanical mining equipment. All of the men selected at Concord were operating foremen. The man chosen to captain the team was a young assistant mine foreman with an industrial engineering and coal producing background. One of the two section foremen in the training group formerly had been a highly qualified loading machine operator and the other formerly had been an excellent mining machine operator. The maintenance foreman selected had an intimate knowledge of the equipment and maintenance problems, having been at the mine since shortly after its opening.

Prior to the start of the expansion program, the training team itself was given a two-week period of intensive training. This training, under the



Captain of training team stresses fact that production is built on safety and training



Training team member gives operating instructions to mining machine crews



Maintenance instructor explains loading machine wiring to sectional repairman

supervision of the company training director and his assistant, consisted of courses in Job Relations, Job Instruction, Job Methods Training and the Conference Method of Training. Also included were special Basic Management courses explaining management-labor relationships and our free-enterprise system. A large portion of the period was spent by the training team in preparing job breakdowns to be used in training the new employees.

Prepare Job Breakdowns

Job breakdowns were to be the nucleus of the training program. They were prepared by the team in the surface maintenance shops. Thus, to prepare a breakdown for tramping the loading machine, the machine was tramped in the approved safe manner while being observed by the team. Then the breakdown was prepared, complete to the smallest detail, showing the important steps to be followed, the key points which made each step easy to do and to remember, and what safety precautions and practices were necessary to complete the job in the safest possible manner. Separate breakdowns for each piece of equipment and each phase of the mining cycle were prepared. For example, five separate breakdowns were made for the loading machine. These included inspection, lubrication, controls, tramping and loading.

Job breakdowns for maintenance jobs were prepared in a similar manner. These showed, to the finest detail, the steps a sectional repairman should follow in doing routine maintenance jobs at the face.

It should be emphasized again that the job breakdowns were the heart of the training program. They were prepared with the concept that job breakdowns are a form of planning, that good planning is a prerequisite to proper training, and that proper training is essential to achieve safe and efficient production. By including safety features in the job breakdowns, safety was made an integral part of the training rather than something added as an extra touch.

After the breakdowns were completed, the training team learned them so thoroughly that explaining the proper use of the equipment became second nature.

Start Training Crews

With the training team ready and available, it was decided to start a sectional shift every two weeks. This meant that the expansion program would progress at the rate of an additional complete triple shift section every six weeks.

Training of the first sectional crew began in November 1950. Before the beginning of training for this particular group, the training team obtained the name of each man and studied

each individual's employment record to determine how much and what type of experience he had previous to employment at Concord. Insofar as possible, the training team attempted to discover as much as possible of each individual's personality and temperament. This aided in determining how to approach the individual and what his reaction might be to the training. At the same time, the team again reviewed the job breakdowns. This procedure was followed for each sectional shift crew subsequently trained.

On the first day, the new sectional crew and section foreman went to their working place underground accompanied by the training team. The team captain introduced his team to

tional repairman was trained by the maintenance member of the team. The team captain worked with the section foreman and coordinated the training activities. It can be seen that the division of training was made along the usual dividing line of face preparation and loading.

No emphasis was placed on production. For the first week training was confined to teaching each man his own specific job. He was taught the safe and correct method for operating his machine and doing his job. The adoption of safe work habits and the proper use of hand tools was emphasized.

During the second week, emphasis was placed on the crew's working to-



Instructor tells and shows how shuttle car works

the crew and explained the reason for their presence. He enlisted their aid and cooperation and stressed that during the training period emphasis was going to be placed on each individual's learning safe work habits. He took the time necessary to explain and describe the layout of the section, the coursing of air, the location and use of first-aid equipment and various other points pertaining to safe work underground.

Following this, the men were given a tour of the section to familiarize them with the area where they would work and the equipment with which they would work.

Operating Pattern Followed

For training, the loading machine crew, the shuttle car operators, the haulage crew and the bratticeman were assigned to the team member with loading experience. The mining machine crew, the roof bolting crew and the shot firer were trained by the team member who was formerly a mining machine operator. The sec-

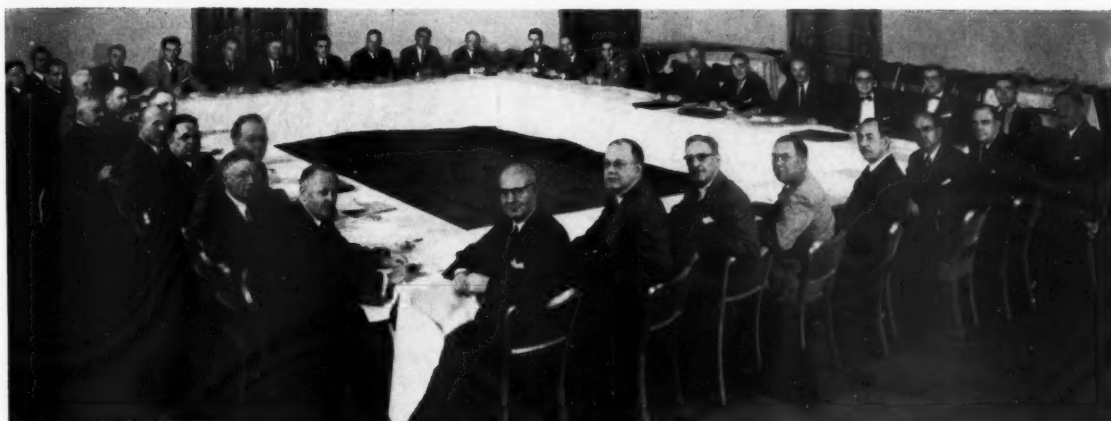
gether safely as a production team. At this time, the training team allowed the foreman and his crew to be more on their own; the team was available but not conspicuous.

The training team functioned in this manner for a period of 42 weeks during which time seven complete triple shift sections were added to the mine complement. While the training team was organized primarily for the mine expansion program, results were so favorable that the training team has been made a permanent part of the mine management organization.

In evaluating the results obtained from the use of the training team, two points concerning individuals and their performance are readily apparent.

Training Uniform

First, each man was made completely familiar with his particular piece of equipment and was instructed thoroughly in safe operation of that equipment. He learned the capabilities and limitations of his equipment, (Continued on page 54)



Every suggestion received fullest consideration at the Program Committee meeting

Coal Show Program

Program Committee Meets to Select Topics for Cleveland Convention Sessions May 11-14

ON Wednesday, November 19, the Program Committee for the American Mining Congress 1953 Coal Convention and Exposition met at the William Penn Hotel in Pittsburgh. R. E. Salvati, president, Island Creek Coal Co. and Chairman of the Committee, presided at the morning and afternoon sessions, where plans for the four-day meeting in Cleveland next year were discussed and the framework for nine convention sessions was constructed. Among the 33 committee members who attended were representatives from every major coal producing area in the country and manufacturers who supply them with the tools and equipment to mine and prepare coal for the market. Every phase of coal mining, preparation and safety was carefully reviewed by the committee.

Topics selected for the program reflect the intimate familiarity of the

committee members with all the newest developments, both those already in operation and those still in the experimental stages. Well aware that by far the largest part of our annual coal production comes from mines using conventional methods, the committee gave due consideration not only to the many new things, but also to suggestions for papers on properties successfully operated along tried and true lines, and qualified speakers will describe performance and improvements on these essential practices.

Net result of this all-day meeting was an outline for nine convention sessions which will run concurrently in Cleveland's Public Auditorium with the greatest Exposition of coal mining machinery, equipment and supplies ever held. As noted below, the sessions have been arranged to allow plenty of time for inspection of the

exhibits. It is always hard to decide which is the more interesting, the sessions or the exhibits. In May 1953 the question will still be a puzzler, but there will be ample opportunity to attend both.

Plan now to take advantage of this once-in-two years' chance to see and hear what's new in coal mining—underground, stripping, surface preparation, safety—how the other fellow is doing it or plans to do it. Here is a four-day course in latest and best practice illustrated by colorful exhibits featuring everything that manufacturers and suppliers have to offer the mining industry.

Many ore miners and producers of nonmetallic minerals too can take a page or two from the coal miner's book to good advantage. Much of the equipment and supplies on display can be adapted to fields other than coal. A cordial invitation is extended to progress-minded mining men, no matter what their field, to come, to see, to hear, to learn.

When that application form for hotel reservations comes to you, be sure to fill it in and mail it right away to the Cleveland Convention Bureau, 511 Terminal Tower, Cleveland 13.

Outline of Sessions

MONDAY MORNING

Roof Support—Pillar Extraction

TUESDAY MORNING

A: Conventional Mechanical Mining
B: Safety, Ventilation, Dust Control

WEDNESDAY MORNING

A: Haulage, Maintenance, Power
B: Management, Costs, Personnel

THURSDAY MORNING

A: Coal Preparation
B: Continuous Mining

MONDAY AFTERNOON

Open for Inspection of Exhibits

TUESDAY AFTERNOON

Strip Mining

WEDNESDAY AFTERNOON

Strip Mining

THURSDAY AFTERNOON

Open for Inspection of Exhibits

That Paley Report

Panel Discussion in Denver Helped Clear Air on Controversial Issues

PUBLICATION of the voluminous report of the President's Materials Policy Commission last June occasioned widespread interest among mining men everywhere. All agreed that the Commission had performed a monumental task. Certain aspects of the report met with approval; others stirred up wide divergence of opinion.

To clarify the atmosphere it was decided to air the whole subject of the so-called "Paley Report" at the September meeting of the Western Division of the American Mining Congress. A panel discussion, with representatives from industry and the Commission, was deemed the best way to bring out all facets of the report. Therefore, Arthur H. Bunker, president, Climax Molybdenum Co. and George R. Brown of Houston, Tex., both members of the five-man President's Materials Policy Commission, were invited to present the Commission's viewpoint and answer its critics. Representing the mining industry on the panel were: Andrew Fletcher, president, St. Joseph Lead Co., Ira B. Joralemon, consulting mining engineer of San Francisco, Simon D. Strauss, vice-president, American Smelting and Refining Co., Edward H. Snyder, president, Combined Metals Reduction Co., Donald H. McLaughlin, president, Homestake Mining Co., Evan Just, vice-president, Cyprus Mines Corp., and Horace M. Albright, president, United States Potash Co. The Honorable Henry C. Dworshak, U. S. Senator from Idaho, presented the legislator's viewpoint.

Howard I. Young, president, American Zinc, Lead and Smelting Co., president, American Mining Congress and Deputy Administrator of the Defense Materials Procurement Administration, presided.

What each of these men had to say is reported, with some condensation, in the following pages, together with pertinent discussion from the floor. The reader is left to draw his own conclusions.

ARTHUR BUNKER, President, Climax Molybdenum Co.: As most of you know, there was published in June of this year a report of the President's Materials Policy Commission. As one of the members of this Commission, I have been asked to come here today to join in a round table discussion of that report.

Since we are going to discuss certain phases of the report, I think that you will be interested in learning something of its history. In January 1951 the President established the Materials Policy Commission and outlined in a general way the problem which he wished to have the Commission study. His letter of instructions of January 22 reads in part as follows:

"This Commission is to study the broader and longer range aspects of the nation's materials problem as distinct from the immediate defense needs.

"This is one of the crucial problems facing the nation. By wise planning and determined action we can meet our essential needs for military security, civilian welfare, and the continued economic growth of the United States. We cannot allow shortages of materials to jeopardize our national security nor to become a bottleneck to our economic expansion. The task of the Commission, therefore, will be to make an objective inquiry into all major aspects of the problem of assuring an adequate supply of production materials for our long-range needs and to make recommendations which



will assist me in formulating a comprehensive policy on such materials.

"I believe the Commission should study, together with any other aspects deemed by it to be pertinent, such questions relating to production materials as:

- (1) The long-range requirements outlook.
- (2) The long-range supply outlook.
- (3) The prospect and estimated extent of shortages.
- (4) The consistency and adequacy of existing Government policies, plans and programs.
- (5) The consistency and adequacy of private industry practices.

"In analyzing these items consideration should be given to the needs and resources of the nations with which the United States is cooperating closely on military security and economic matters.

"In formulating final recommendations, your Commission should take into account all possible methods of bringing supplies and requirements of essential materials into balance.

"Of course you will want to solicit the cooperation of private industry. Although the Commission will organize its own regular staff and secretariat, it may call upon other agencies for any special staff assistance which may be needed."

The President left us a great deal of latitude and freedom on how we would deal with this extensive subject. This in turn required that we reach some fundamental decisions concerning the scope of our work and the basic tenets under which any recommendations should be made.

The Commission decided that the nature of the assignment would require that the problem be examined on a very broad front.

The question of what time span should properly be en-

compassed in the study was, of course, a controlling one. The Commission concluded that it should try to select some period which was not so distant that it would be strongly affected or dominated by technological or other developments now wholly unforeseeable but long enough to show the effect of this country's dynamic trend in consumption of materials. With this in mind, the Commission felt that it was reasonable to try to peer into the future to the extent of 25 years.

It was assumed that for this period there would be no all-out war, but continuing international tension, and consequently continued maintenance of an active rearmament program.

We then addressed ourselves to describing our general beliefs. First—we shared the belief of the American people in the principle of growth. We could not conceive of an America that did not continue to improve its material standards, or to consume more per capita at a fairly steady rate of increase. To interrupt this force, seemed to us could only cause insupportable dislocations.

Second—We believe in private enterprise as the most efficacious way of performing industrial tasks in the United States. With this belief, "the price system" obviously goes hand in hand. We believe in a minimum

ence has been closely connected with raw materials for many years, and my war experience as a vice chairman of the War Production Board in charge of metals and minerals, and finally chief of staff of that organization. We brought together a fairly diversified background.

In acquiring staff we were able to collect more than 100 individuals selected in great part from government, universities and industry. The Commission, of course, had the fullest possible access to data in any of the government agencies.

One of our main problems was where and how in the limited time available we could get all possible advice and counsel from industry and other sources outside of government. The Commission well knew that such advice and counsel was an essential part of any study of this nature and that careful arrangements would have to be made to be sure we were receiving adequate and representative fact and opinion. In general this solicitation of outside opinion and counsel took five different forms.

Industry Meetings—In the first place we established industry meetings. At these meetings the Commission asked leading representatives of industry to sit informally with it and discuss first the factual basis of data which was being assembled and then the policy recommenda-



Authors meet the critics

of interference with this pattern of private enterprise. But to believe in a minimum of interference is not to believe that this minimum must be set at zero. As we see the future, the coexistence of great private and public strength is not only desirable but essential to our preservation.

With an age of full employment, we believe we must reject self-sufficiency as a policy and instead adopt the policy of the lowest cost acquisition of materials wherever secure supplies may be found.

To sum up, "The over-all objective of a national materials policy for the United States should be to insure an adequate and dependable flow of materials at the lowest cost, consistent with national security and with the welfare of friendly nations."

With the background of these basic premises, we then proceeded to collect an organization capable of assembling, analyzing and evaluating the vast amount of material needed to demonstrate the nature and dimensions of the problem.

As you may know, the Commission consisted of: Mr. William Paley, founder and president of Columbia Broadcasting System, as chairman. Mr. George Brown, a mining engineer from Texas who has had extensive experience not only in mining, but in the production of oil, the production and transmission of gas, and many other business enterprises. Mr. Edward Mason, dean of the graduate School of Public Administration at Harvard. Mr. Eric Hodgins, former vice president of *Time* and a member of the Board of Editors of *Fortune*. My own experi-

tions which would seem to naturally flow from an examination of these facts.

In the case of metals and minerals, the National Minerals Advisory Council was of particular assistance. We owe a great deal to their capable and prompt cooperation.

Questionnaires—The second general procedure was to accumulate opinions through questionnaires. In the metals and minerals field we submitted a questionnaire of over 40 pages to some 275 companies. We obtained about 60 percent returns, and in many cases detailed replies. These were of very great use and benefit to the Commission and to the staff.

Technology-Outside Assignments—In the technological field, the Commission determined very early in its course that it could not develop by its own limited staff all of the basic research data that it would need. It therefore drew up specifications for many special projects and assigned them to such outstanding organizations as Battelle Memorial Institute, Arthur D. Little, Standard Oil Development Company, Universal Oil Products, Koppers Co., American Standards Association, and a panel formed by the National Research Council.

Consultants—In the matter of consultants, the Commission was able to obtain the continuing help of an extremely able group of individuals from 20 universities, from industry, and from the professional group in all of the fields which we were examining—metals and minerals, petroleum, power in all its forms, forest products and technology. Other consultants who could not come and work with us in Washington were reached by interviews and

field trips by staff members. This greatly widened the range of information on which the Commission was able to draw.

Review Procedure—In the spring of 1952, the Commission went to an extensive number of industry representatives and asked them to read drafts of the report and to write down their comments and suggestions. Some 70 members of private industry were consulted in this way for the dual purpose of assuring factual accuracy and obtaining informed opinions on how the subjects had been developed. The Commission was thus provided with the thoughtful considered opinions of literally hundreds of well informed individuals, skilled in their special fields.

The first phase of our work was the practical matter of establishing estimates and assembling data. This required that we make a general estimate of the size of the United States in 1975; what might be the population, the total working force, the length of work week, the rate of growth. We obtained many calculations showing wide variance, but we chose, we believe, a conservative middle course.

The assumptions of this middle course are a population of 193,000,000, a working force of 82,000,000, and a work-week 15 percent shorter than today. We have assumed a rate of growth for the U. S. economy roughly equal to our growth in the past, or about 3 percent a year. This would mean that our gross national product would about double by 1975. This would not, however, mean a doubling of our need for materials, because past experience has taught us that each dollar of raw materials tends to support increasing amounts of goods and services (for example, in the same dollars \$1 supported \$7.80 of goods and services in 1950, while only \$4.20 in 1900).

Next we looked at this history of the past 50 years to see what facts it might substantiate. As the facts were compiled of the 1900-1950 era, they began to tell us that: with 9.5 percent of the world's population and 8 percent of the land area, we consumed in 1950 one-half of the world's raw materials. It told us that since the beginning of World War I, the United States alone had consumed more goods than had been used throughout the whole previous civilization. At the beginning of the century we produced 15 percent more materials than we consumed, and in 1950 we produced 10 percent less raw materials than we consumed. The trend in consumption continued strongly pointed upward. If such a force continues until 1975, we will need to import 20 percent of the raw materials we consume, or three times the volume imported in 1950.

From 1900 to 1950 the population of the country doubled, but our material output expanded fivefold. To achieve this, the increase in consumption of some raw materials was as follows:

- We used 2½ times more bituminous coal
- 3 times more copper
- 3½ times more iron ore
- 4 times more zinc
- 26 times more natural gas
- 30 times more crude oil

We have become the world's largest importers of copper, lead, and zinc, where we once were huge exporters. We are bringing in sizable quantities of petroleum and iron ore, which once were probably our best areas of self-sufficiency, with every evidence this must increase rather than diminish.

Policy—The President had requested that we examine the facts and assist him by recommendations "in formulating a comprehensive policy." There certainly has been no national materials policy; nothing that in any sense had taken an over-all look at the constituents of the problem, and derived a course of action. While there had been no materials policy as such, the federal government has certainly taken many steps that influence prices, the availability of materials, and the rate of production, but they are a loose unconnected pattern, and are again not derived from any over-all consideration of the total problem, to serve the dynamic demands of our peacetime economy,

or to provide for those very different conditions of supply and requirements that are the basic conditions of national security.

It is not often it falls to the lot of anyone to catalog the activities of our government in any one area. We found, however, that we must review those undertakings now in force which have any bearing on the materials problems. We found these activities of our government could be classified in six major roles:

(1) As conditioner of the economic environment, the government, through tax policies, fiscal, monetary, and credit policies, labor policies, and the enforcement of the antitrust laws, affects private costs, prices and profits, and hence in many cases influences materials production and use.

(2) As regulator of private industry, in the protection of the public interest, the government affects the rates and markets of "natural monopolies" in the fields of electric power and natural gas. The allocation of scarce materials and the curtailment of their use under emergency conditions provide other examples of regulations.

(3) As guardian of foreign relations and national security, the government has in recent years greatly expanded its activities in the materials field.

(4) As owner and custodian of resources, the government is the landlord of vast areas of mineral lands, proved and potential; of forest and grazing lands, and supervisor of all navigable rivers, streams and coastal waters.

(5) As supplier of services to private industry, the government supports the mapping work of the U. S. Geological Survey and many activities of the Bureau of Mines, including its technical research and development work on such problems as manganese and shale oil, and its statistical publications, designed to help private industry. In the Department of Agriculture, programs of technical research and educational service, soil conservation, and pest control are designed to strengthen the economic position of producers and the resources with which they work.

(6) As buyer and user of materials, the federal government is a major purchaser and user of material in the United States economy, its military, foreign aid, and construction programs accounting for the bulk of what it buys. It thus exerts strong influence on market conditions, as in stockpile buying. Through its research and testing activities it greatly affects product development, design, standards and specifications. The efficiency with which government itself uses materials has a heavy bearing upon the whole materials situation.

These existing activities of the Federal, State and local governments form an extensive and complex pattern. It is not surprising that the elements of the pattern are sometimes inconsistent and badly out of balance when measured against the ideal of a comprehensive and unified national materials policy. In a strict sense, this pattern of governmental materials policies and programs is but a loose array of measures which influence the nation's present and prospective materials position.

We believe the task of overcoming the materials problem is far greater than merely locating enough physical resources. The task is to overcome multitudinous barriers and to offer positive spurs and encouragements for developing and applying energy and technology to the materials field, for insuring a sufficient flow of capital into it, for guarding our security, and concerning ourselves at every point with insurance against rising costs. Only a consistent policy toward materials can hope to bring these accomplishments about.

A materials policy, broadly conceived, must provide a framework for public programs, and for private policies and actions, all moving harmoniously toward the same national objectives. It is the Commission's belief that the bulk of the task of insuring adequate future materials supply can best be carried out by private business under the competitive market structure, operating within broad policy outlines which it is the responsibility of the government to provide.

The recommendations of the Commission do define policy as writing the broad outlines, but not without encroaching upon private enterprise. The government should do a number of things, which in the interests of national security and economic growth must be done promptly, and for which no incentive to activate private enterprise is seen. We remind you once more that we were not asked to review the short term emergency measures adopted to meet the present Korean, or re-armament situation. We have been concerned entirely with the longer range view.

We recognize that our recommendations are appropriately the area of debate. We hope that these problems will get your serious, thoughtful, and careful attention. But having said all of this, I should like to conclude my remarks by emphasizing a statement of justified humility that we state very early in our report—"Clearly a task of such scope and complexity cannot be completed in one attempt, nor can it ever be safely regarded as complete. The five volumes of this Commission's report are offered only as a beginning. The most important conclusion this Commission presents is this—that the job must be carried on cooperatively by government and private citizens, not periodically at wide spaced intervals, but day by day and year by year." It was upon this basic concept that the report was written.

ANDREW FLETCHER, President, St. Joseph Lead Co.:

The difficult problem with which the Paley Commission was faced is appreciated. No one can foresee with any great competence, what our economy will actually be in 1975. If we were to go back, just 25 years, who could have predicted dieselization of our railroads, new industries such as television, plastics, new textile products, or the conquest of international transportation through the air? We stand on the threshold of the atomic era, which may well revolutionize life for all of us.

I intend to base my comments about the Report, on Lead, the metal with which St. Joe is most familiar. The Commission foresees an annual lead deficit of 900,000 tons in 1975—by "deficit" is meant the difference between consumption and domestic mine production plus recovery from scrap. St. Joe's estimates support a "guess" of a probable 200,000 ton deficit—a reduction of 700,000 tons per year. Whether we or the Commission are even reasonably close to a correct deficit estimate, would be only of academic interest to prove that different figures and assumptions give an entirely changed picture—if it were not for the fact that the Commission's forecast is subject to severe criticism. Furthermore, their 900,000-ton deficit may have frightened them into recommending the adoption of such alien control measures as multilateral government contracts, buffer stocks, quotas, etc., which if adopted, will result in the socialization of the domestic, as well as the world, mining industries.

The reason for the enormous difference of 700,000 tons per year between St. Joe's forecast and that of the Commission can be briefly summarized as follows:

(1) Consumption:

The Commission estimates that the 1975 lead consumption will be 1,950,000 tons. They have arrived at this figure by using 1950 as a base, with a projection of increased or decreased consumption of end uses over the next 25 years. We criticize the choosing of 1950 as a base, as this year happens to record the highest consumption in the history of the industry. I will not analyze each particular end use, because if the base is wrong, the estimate of ultimate consumption will be far from accurate.

However, one of the important producers of tetra-ethyl lead has told us that they do not anticipate that the industry will increase its lead consumption by 150 percent

and use 300,000 tons per year in 1975, as estimated by the Commission. Incidentally, this company was not consulted in the preparation of the estimate.

Lead is one of the oldest known metals, and its various properties are well established. Consequently, it is not surprising to find its per capita consumption at a fairly steady figure, year after year. To the extent that new uses are developed old ones are lost. For example, the growth in the use of tetra-ethyl lead is about offsetting the loss in white lead pigments, cable covering, foil, etc. The average per capita consumption for the two decades of the 1920's and 1940's—both periods of high industrial activity, is around 15 lbs; and if one were to include the 1930's it would drop to 13 lbs. For the last ten years it has averaged 14.7 lbs. Using this per capita consumption figure and the Commission's anticipated population of 193,000,000 in 1975, we arrive at a projected consumption in that year of 1,420,000 tons—approximately 500,000 tons less than the Commission's figure.

There is another reason for doubting the Commission's lead consumption forecast. From 1925 to 1950 the population growth was about 36 percent, while lead consumption grew 33 percent. But, for the next 25 years the Commission assumes a lead growth of 61 percent, although they estimate a population growth of only 27 percent. Therefore, using past experience as a base, the lead consumption would increase 25 percent, not 61 percent over the next 25 years. With a present consumption of around 1,000,000 tons, exclusive of stockpiling, the 1975 consumption would approximate only 1,250,000 tons. However, I assure you, that we in the lead industry are constantly striving to increase our markets, so I think a consumption of around 1,420,000 tons is probably a more reasonable forecast.

Another pertinent criticism—as an apparent justification for using the 1950 consumption of 1,212,000 tons as a base, the Commission refers to the War year of 1943, and points out that the consumption was 1,330,000 tons. However, the Commission made an error in overlooking the fact that nearly 300,000 tons of the 1,330,000 tons were stockpiled—not consumed.

(2) Production:

In 1948, at the request of the National Security Resources Board, we made an estimate of primary world lead production for the period up to 1970. We communicated with the major lead producers throughout the world. The estimate which was arrived at for the United States was 375,000 tons, which is 75,000 tons in excess of the 1975 Paley Commission's estimate of 300,000 tons. We anticipate no decline between 1970 and 1975, provided unrealistic governmental controls become no worse than have been experienced.

Due to lack of time, I am forced to confine my comments to the domestic situation, but our estimate of future foreign production is considerably in excess of that of the Paley Commission.

For scrap recovery the Commission has again used 1950 as a base, but their figure is in error, as the actual recovery in that year was 482,000 tons—not 428,000 tons as stated. The average recovery of scrap in comparison with total consumption for the last five years, has been 43 percent, and the optimum recovery according to the Commission's own chart, is 60 percent. The Bureau of Mines has shown that the reservoir of metal in use increased over a million tons during the nine-year period of 1939-1947, and with annual consumption of roughly a million tons a year, this reservoir will certainly increase greatly by 1975. Therefore, it would seem that the 1975 scrap recovery might amount to 850,000 tons per year, which is around 60 percent of St. Joe's estimate of 1,420,000 tons for prospective lead consumption.

(3) "Deficit":

The total of our estimated primary production of 375,000 tons, plus the potential 850,000 tons from scrap is 1,225,000 tons, which when subtracted from the consumption of 1,420,000 means that around 200,000 tons would have to be made up by imports. This figure is far less



than the actual imports which have averaged 337,000 tons per year over the last 12 years. We therefore see no reason why lead consumers, or any one, should be alarmed about the future lead supply.

Supposing the Commission had estimated a deficit of about 200,000 tons, and shown the necessity for importing less than we have in the last 12 years. Their recommendations for international controls, buffer stocks, price stabilization, etc. would just look silly.

The disparity between the Commission's "deficit" and St. Joe's certainly indicates wide difference of opinion and raises the question whether similar differences exist in the cases of other commodities.

Mr. Bunker: I have not had the opportunity of looking at Mr. Fletcher's statistics, and I have only heard them just now. I am sorry that he doesn't agree and thinks the Commission is reasonably off base, but I don't happen to believe that what he has to say, that all the figures he has adduced have a distinct bearing on the case.

We have said from beginning to end, and everybody must know, that nobody can be a pin-point crystal gazer. Nevertheless every business and every family must make forward estimates, possibly not for 25 years, but for some period of time.

Now, certainly, estimating population growth seems a more legitimate thing than maybe any other form of estimation. We have watched our increased life expectancy, and we have taken the most modest population growth of any serious group who were studying and working on that problem. But let's come back to the subject of lead.

Mr. Fletcher says that we took 1950 and should not have done so; the real consumption in 1950 was 1,200,000 tons. Of this, the United States with very favorable prices could produce only one-third. When 25 years ago they could produce 100 percent of our needs, they could produce one-third of our needs in 1950, and that's all they can produce today. And I think that's a very serious problem in terms of national security. Suppose there is no increase—they can produce only a third in 1975. It remains a very serious problem.

Let's say another thing. Whether we use 1,200,000 tons or 1,950,000 tons, 25 years hence, in terms of our ore reserves, we see quite an extraordinary situation. The industry reported to us that the known reserves in the United States, as they wished to report, were 1,750,000. We have repeatedly said in the Commission's report, of course, we think there will be many million tons more found. We have said there will be a lot of problems in finding it and locating it and different mining and recovery methods used, but I am sure you will all agree that, if you can use a million and a half tons of ore a year and then admit you have 1,500,000 to 1,750,000 tons of known reserves, it's not a very happy condition, and if you couple with that the fact that the ore you can produce is one-third requirements and imagine it in time of war, it's not a happy condition.

What are the new uses? The new uses are going into gasoline which produce no scrap or recoverable materials at all.

I happen to think the issue is that you have an important problem when you can produce only one-third of your country's needs, and not whether some statistics are going to prove to be just exactly right.

Mr. Fletcher: I am very happy to have Mr. Bunker admit that his estimates are probably just as apt to be wrong as our estimates are. But I would like to have somebody explain why there was such a difference of opinion, and is the difference of opinion the justification for beginning international agreements, buffer stocks, price controls, and all that? That's the only thing that worries me.

Mr. Bunker can guess just as well as we can guess, but I want to know why they guess such a black picture when we have told the National Security Resources Board, we have told our customers, we have told everybody that

we are not worried about the future supply of lead, and I told that to the Committee before they came out with the report. I want to know why they paint such a black picture after we who theoretically know what we are talking about gave them a pretty optimistic picture?

Mr. Bunker: I would like to say one more word.

We think when you come out and say you can produce a third of what you need, it is really a cause for worry, and I don't think the problem changes its aspects at all whether it's 28 percent or 44 percent.

Let me say this. There has been an undercurrent, an insinuation that the Commission has devised figures so that we say, "All right, we must increase the possibility of production; then consequently, we must increase our estimates and the possibility of consumption so that we throw a bad picture on the screen."

Now, nobody is sure what hundreds of people do, but the Commission dealt with this question with whatever intelligence it might have had and with integrity of the highest order.

Obviously, we have a very peculiar situation in lead statistically, but I have not heard nor has the Commission heard of any other single commodity's quarrel on the basis of rough estimations of the future. This happens to be an isolated case, but it is not appropriate to suggest and insinuate the Committee tried to make a bad case. I happen to think, using Mr. Fletcher's statistics, the case is very bad indeed.

SIMON D. STRAUSS (*Vice-President, American Smelting & Refining Company*): I shall confine my initial discussion to the Commission's recommendation that international buffer stocks should be created by our own and other governments for the purpose of stabilizing raw material markets. This is a proposal of such magnitude that it alone could properly be made the subject of our entire proceedings. I shall therefore be able in the allocated time to discuss only a few aspects of it.

The Commission believes that wide swings in raw materials prices discourage investment in new ventures and that consequently capacity tends to be inadequate to meet the peak levels of demand at times of international stress. In addition, it argues that stabilizing raw materials prices would assist the economy of the so-called underdeveloped countries, thereby reducing the hazard of political disturbances and perhaps preventing expropriation of foreign investments such as has occurred in the Near East and in Latin America.

This is tempting bait to our industry. Miners are apt to grow impatient with those of us in the commercial end of the business when they see prices of metals decline. Complaints on their part about rising metal prices are rather rare. The prospect of being able to plan development and production from a mineral deposit with assurance that prices will not vary materially is bound to appeal to the miner.

But, before we leap to the bait, let's examine what is really entailed. Two questions immediately occur: One, is the plan really feasible? Can it be made to work as the Commission suggests? Two, further, regardless of the answer to question one, is the plan compatible with the spirit of free enterprise?

Let us deal first with the feasibility of the scheme. The Commission's report suggests that these buffer stocks would be operated by an international group in which both producing and consuming countries would participate and to which both would contribute financial support. Each country's contribution might be determined, the Commission says, by its relative share in world exports and imports.



There is a problem of currency here. Would each country's contribution be in its own currency? When the buffer stock buys, would it pay for its purchases in the currency of the country from which it buys? When it sells, will it sell in the currency of the country to which it sells? If so, the weak currency will soon drive out the strong. The buffer stock may find itself with most of its working capital, after a time, in, let us say, lira and yet most of its purchases to be made in, let us say, dollars.

The Commission states that the aggregate cost would not be so great as to overtax the resources of participating countries, but gives no estimate of the actual amount required. My own guess is that the amount would have to be at least as great as that involved in the United States stockpile effort, a program now estimated at over nine billion dollars. Further, I would say that the resources of the participating countries are already overtaxed without any buffer schemes—in the sense that most governments are operating at staggering deficits and are levying record-breaking taxes. Another nine billions cannot be shrugged to one side as of no moment, but probably should not be the major consideration.

A far more serious objection is the improbability that the fifty-odd nations which will be involved in the management of the buffer stocks can be brought together to operate in an effective or prompt manner. Let us look at the record of a few recent attempts at international economic cooperation.

An International Tin Committee on which all the leading tin-producing and consuming countries are represented has been in existence since the end of World War II. The Committee has met at least once each year. Statistics have been hashed over, proposals have been put forward for expanding production or limiting it; for increasing consumption or limiting it; for price stabilization or for price decontrol; and for international agreements to assure the stability of the tin market for years to come—protecting the interests of consumers and producers alike. The participants in these conferences have included the usual range of real experts, of sincere and well meaning government people, of responsible representatives of industry, and of bumbling bureaucrats who have gone along for the ride.

What have been the actual accomplishments after six years of interchanging ideas? None!

The second experiment was the International Monetary Fund which was formed at the end of World War II to facilitate unimpeded multilateral trade and the general convertibility of currencies. Fifty-four nations are now members of the fund. Please note that currencies are produced by governments. This is a field in which private enterprise is prohibited, a field in which government has undisputed power. Here surely international cooperation should be successful.

The currency equivalent of an international commodity buffer stock was set up for the Monetary Fund. The total of all individual quotas amounted to more than \$8,000,000,000,000. Yet, in the first seven years of operation only ten percent of this total has been actually used. Despite the existence of the Fund, its management reports that during the last seven years the balance of payment difficulties have been continuous or recurrent, and most countries have either been unable to make substantial progress toward freer international trade, or have had to reverse from time to time some of the steps taken in that direction. This is the Fund's own description of what has occurred.

If an international group consisting solely of government representatives is unable to stabilize the value of currencies, which governments alone can issue, is it likely that they can successfully stabilize the value of commodities produced by private enterprise?

Government operation by its very nature is slow and cumbersome. Within our own governments, negotiations for Bolivian tin, Chilean copper and many other minerals have been delayed time and time again not by deliberate

procrastination, but by the necessity of reconciling the divergent views of the Munitions Board, the RFC, the General Services Administration, the Office of Price Stabilization, the Defense Production Administration, the State Department and the Department of the Interior. When a decision is finally reached the situation frequently has meanwhile been altered radically and a policy that may originally have been sound is no longer applicable.

If our own Government is so slow in coming to a decision, what then about an international group? The answer can be found in the futile record of the International Materials Conference, the accomplishments of which have been substantially nil.

The Commission describes the buffer stock as being based "on reasonable anticipation of the long run price of the material under control. Ceiling and floor prices would be based on the best estimates of future production and consumption, periodically modified in the light of actual market behavior and revised forecasts."

Today we have Mr. Bunker's and Mr. Fletcher's forecasts, two able gentlemen with two honest differences of opinion. I submit, gentlemen, that any international buffer stock would run into those differences constantly. It would not be a matter of disagreeing today about 1975, but disagreeing about 1953.

Political considerations would be certain to influence the decisions. If the authorities concluded, for instance, that world aluminum production should be fostered at the expense of copper, then that is what would happen. The Defense Production Administration last year was for a time following a course that seemed intended to foster the one industry at the expense of the other. On an international scale similar favoritism would have results incalculably more damaging because with their power to set minimum and maximum prices and to withhold or market stocks running into the hundreds of thousands of tons the central authorities would have undisputed control of the market.

Furthermore, how good is governmental judgment likely to be as to the long run prices of the materials under control? At best, it will be no better than that of private industry, which is subject to wide error, and more likely, it will not be as good. Let me cite an instance.

Convinced that shortages of lead and zinc would prove long lived, the British last year bought large quantities of both metals for delivery extending into this year at prices of 21½ and 23½ cents a pound, respectively. Had it not been for this British buying during 1951, the prices of lead and zinc outside the United States would not have gone as high as they did and the shortages would not have been as pronounced.

But, by the end of the first quarter of 1952, the physical stocks of lead in the United Kingdom were so great that the British government resold a huge tonnage of lead to the United States stockpile at losses ranging upward from \$50 a ton. As for zinc, with the present market price of 13½ cents a pound—the British are still taking delivery of large tonnages at prices in excess of 20 cents a pound and their stocks are climbing by several thousand tons a month.

The British position in zinc is now such that they have told all sellers of zinc to Empire producers that they will buy no zinc whatsoever during the first half of 1953.

Any group undertaking the same job might well have made the same mistakes. My point simply is that when a government or a group of governments errs, the effect on the market is infinitely more serious than when a private buyer or seller does so.

The private consumer might well have made the same mistakes. Frequently the private seller misjudges the market trend, but a private consumer or a private producer can push his error only so far, and then the inexorable factor of financial prudence makes him correct his position.

A governmental buying agency—and this is doubly true of an intergovernmental agency—has almost unlimited re-

sources at its disposal. It simply taps the public till for additional funds to perpetuate its mistakes.

Private investors are all too aware of the unpredictable turns which governmental decisions may take. Regardless of the assurances that may be contained in any agreement establishing an international buffer stock—investors would be bound to look with a jaundiced eye at the existence of huge inventories of metals in the hands of a group of government officials subject to political pressures; Elections in Chile, revolutions in Bolivia, confiscation in Iran. One can't forecast what the nature of that political pressure would be.

The buffer stock proposal is advanced by the commission on the theory that it is difficult for private capital to operate in a market in which prices fluctuate widely; it would be intolerable, however, for private capital to work in a climate in which the entire investment is in constant jeopardy because of potential political decisions of an organization responsible to no single nation or to no single group of stockholders.

All efforts in the past at international controls over raw materials have been a failure when these efforts have been made by private cartels. The substitution of politicians for industrialists does not make the cartel theory any more palatable.

Mr. Bunker: I would like to make a short reply. The only statement that Mr. Strauss made with which I violently and completely disagree is the one in which he became a mind reader. He said that Mr. Bunker believes exactly the things that Mr. Bunker doesn't believe in. I don't feel for a moment any confidence in the government blueprint. I never have and have spent a great many years with the government, and I don't know why Mr. Strauss assumed that he could read the innermost sanctuaries of my mind, but I really don't believe he could at all.

Now, just let me go on and say that I do not at all read in our report what Mr. Strauss reads. We have in our Volume I a review of the difficulties of doing business and of obtaining materials under the best conditions from foreign shores. I don't think there is much argument as to whether we need materials from foreign shores in increasing abundance at good, low prices, and the question is how to get them. In subsequent volumes we expand the difficulties about tenfold and say there really isn't anything more difficult, and then we say we think industry and everybody who is engaged in this thing should really regard this as one of the tough ones and explore it and see what they can do about it, hopefully, that there may be some way you could improve the rules of the game.

We all agree that the free enterprise system of price control is not a bad thing. We say the sharpness and the violence of it sometimes certainly does delay, postpone and interrupt the creation of capital formation and productive facilities, and so, we finally say in our language, "We think you must explore these other things, see if you think they will work as an alternative to licking a tough problem."

Mr. Strauss: I would very much like to reply, and I apologize to Mr. Bunker for having said "Mr. Bunker" when I should have said "The Commission." That was unintentional.

Let me read you the Commission's conclusions on this, "The Commission believes that on balance the international arrangements that hold the greatest promise for stabilizing material markets and at the same time, for promoting the increased production of materials that the future will demand are the multilateral contract type of agreements and buffer stock agreements either without or with quota provisions on exports or production." The report says "The Commission believes." I don't believe it and that's what I was trying to say.

I would like also to say this: that I do not believe even the exploration is worth the effort.

My candid judgment is—and I agree with Mr. Bunker

in this—that the present system tends to delay and harass the individual producer; it makes investment a risk, but it's always been a risk in our industry, and for my money, it will continue to be a risk in preference to becoming the subject of governmental decision. Centralization of power, centralization of decisions is getting to be the greatest evil of the day. We are putting too much power into too few hands. I say in the metal markets, let's keep the power in as many hands as possible.

Howard I. Young: I know you will pardon the Chair for making an observation. I agree with this free market business, but let me say one thing. If those responsible for markets are going to cut the throat of the domestic producer, as has been done in some commodities, in the not-too-distant future, they are inviting exactly what they are opposing at this time.

IRA B. JORALEMON (*Consulting Engineer, San Francisco, Calif.*): The report of the Paley Commission is one of the finest source materials for the study of the mineral industry that we have ever had. However, many of us differ with some of the projections and some of the conclusions.

I am going to cover just one small aspect of the conclusions now in a few minutes, and I don't want it to be taken as a general criticism of the report.

The underlying theme of the useful and informative report of the President's Materials Policy Commission is that the United States has become a Have-Not nation that must rely on other parts of the Free World for an increasing proportion of its raw materials. The fact is, rather, that the world is a Have-Not world. All parts of it must rely on trade with other parts for a large portion of the raw materials or commodities needed for a high standard of living. We are no exception, but we are more favored in raw materials than any other nation or area.

The statistics given in the report bear out this conclusion, though many of the forecasts are at variance with it. The facts show, not that we lack raw materials more than other parts of the world, but that we use them with a reckless prodigality that no source of supply could keep up with. If the rest of the Free World approached our living standard, consumption of mineral raw materials would increase six times. There isn't any such supply in the world. The report recognizes this, but assumes that our use of metals will continue to increase, in proportion to population, more rapidly than that of other parts of the world. This would inevitably cause increasing hatred against us by all the peoples that are falling further behind us in the race for greater comfort and material security. It is real isolationism. It can result only in an eventual war in which we will be the lonely fat boy with a big stick of candy, surrounded by hungry toughs.

A glance at the projected future use of metals in and outside of the United States emphasizes the disparity. The charts on Page 22 of Volume I of the report show a definite trend of increasing domestic consumption of the principal minerals and metals in the past 50 years. However, if allowance is made for the greatly reduced consumption during the great Depression and the fantastic peak of war and post-war use of materials in the 40's, it is evident that the curves of domestic consumption of most of the vital raw materials are already beginning to flatten. This is in line with the sine curve that is characteristic of all living activities. As noted by Raymond Pearl and others, this curve applies to colonies of yeast cells, to the life of the individual man, to population increase and to the history of empires. A slow initial increase is followed by a period of almost explosive growth,



which in turn is followed by a gradual slackening of the rate of growth.

Such a curve is entirely reasonable in the case of the use of mineral raw materials. The period of construction for mechanized living requires an almost unbelievable amount of metals and other supplies. As the capital plant approaches stability, the rate of growth becomes slower. We are approaching this later phase. Except for the war and post-war peaks, we would certainly be well along on the flattening portion of the curves of most of the principal raw materials.

The forecasts in the charts for projected future consumption pay no heed to this tendency. Instead they assume a constantly growing rate of increase in domestic consumption. For instance in the case of copper a projection of consumption curve, evening off the valley of the 30's and the war time peak, shows a probable need for about 1,800,000 short tons in 1975. The Commission forecast is 3,600,000 short tons, which assumes a continually steepening curve in the next 25 years. Corresponding figures for zinc, lead, iron ore, chrome, manganese, fluor-spar and sulphur show similar discrepancies between the projected curves of actual consumption and the 1975 consumption assumed by the Commission.

The fantastic domestic use of the principal raw materials foretold by the Commission is best illustrated by the fact that in the next 25 years they think our population will increase by 27 percent, while our consumption of vital materials will increase by 100 percent.

In contrast with this explosive domestic use, the Commission forecast for increase in foreign use of most materials is comparatively moderate. This is in spite of the fact that the rest of the world must build up its capital plant if it is to attain a living standard that is even remotely comparable with ours. The friendly nations that the Report calls "advanced" should be entering the steepest part of their curves of increasing consumption. The so-called "backward" nations—which include our Latin American friends—have hardly started their march toward a standard of living that we would scorn. They must be able to use a much greater share of their own and other resources if they do not follow the hungry hordes of the northern Asiatic countries in accepting the vain promises of Communism.

Our only hope of continued security lies in the friendship of other Free Nations. The Commission report rec-

ognizes this. It makes much of the fact that its forecast allows a greater increase in consumption of key commodities abroad than at home, and that such a relative gain is necessary if we are to live in a friendly world. It does not show, however, that while total quantities of these materials used abroad will increase more rapidly than those used in the United States, the situation is completely reversed if relative populations are taken into account.

A little arithmetic, added to the figures in the Report, shows the shocking discrepancy. According to the Commission's estimate for 1950 and 1975 consumption, we now use 23 lbs of copper per individual per year, and this annual use will increase by 2.9 lbs by 1975. Other "advanced" Free World countries used only 6.6 lbs of copper per individual in 1950, and this will increase by 2.2 lbs in 1975. We now use almost four times as much lead as other "advanced" friendly nations, and our consumption will increase by almost twice as much per head by 1975. These examples are characteristic of all save a few commodities. They show that the Commission expects the gap between our standard and that of other friendly "advanced" nations to become greater rather than smaller.

In the case of the so-called "backward" friendly nations, the discrepancy is even more hopeless. These nations now use only a third of a pound of copper per individual per year compared with our 23 lbs, and their consumption is supposed to increase by only a quarter of a pound in the next 25 years. In other commodities of which the "backward" nation consumption is listed, the ratio is similar. In an age in which the resurgence of the "backward" nations almost amounts to a revolution, how can we expect to keep their friendship if we dole out to them mere pittance of their own resources?

In all save a few materials such as nickel and tin we would be far better off than the rest of the world even if we had to depend on domestic sources alone. Our boasted superiority in technology has in the past made it possible for us to use lower grade orebodies than those which are mined abroad. A continuation of technological progress should reduce our dependence on foreign countries to a healthy interchange of goods.

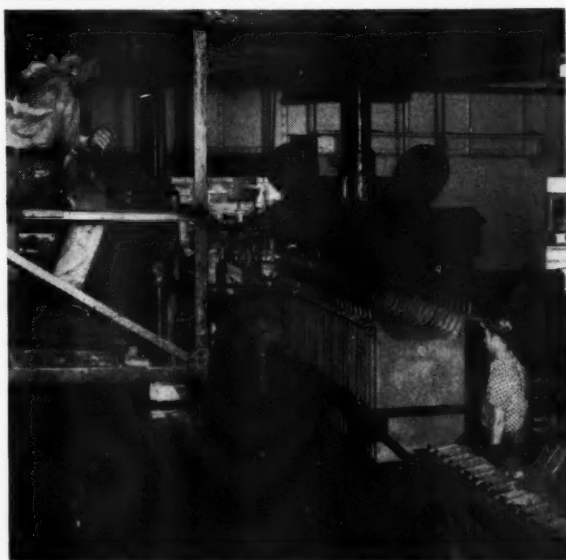
Such normal trade is far better than domineering control by government agencies. It promotes good feeling on the part of other nations rather than hatred. Unlike government financed development, when a private company becomes too grasping in the operation of its foreign properties, it can be controlled by law or even confiscated without causing a war. It is far more important for us to keep friends among the nations on our side of the Iron Curtain than it is to speed up an increased standard of living at home at the expense of that abroad.

Perhaps the worst feature in the world-wide planning that is advocated by the Commission is the self-satisfied claim that it is based on "enlightened self-interest." Enlightened self-interest is just a fancy phrase for selfishness you think you can get away with. If we are not willing to allow the rest of the world to catch up with us in living conditions, let us at least not make this greed a matter of avowed public policy.

Mr. Bunker: I would like to talk a little about the same subject matter. I don't pretend that I understood everything that Mr. Joralemon was saying. However, I did make some notes. For example, to start in with the report, I think the report is replete from end to end with reference to the fact that the enlightened self-interest of the United States is linked up completely with the well-being of all friendly nations outside of the Iron Curtain.

It also says that in the consumption of materials, nations, other than the United States, can well be expected to increase their percentage consumption of materials at a far greater rate than the United States, and makes statistical provision for their consumption.

We go through the report and say again and again that we are not a "have-not" nation. We say even at the end of the 1975 period, compared to almost any other



According to the Report, we will be using 25.9 lb copper per capita per year in 1975

nation in the world, we will be replete with enormous amounts of raw materials, and if forced to sustain ourselves, can do so on a very, very high level standard of living. We do, of course, say that we will be using, as far as we know, the lower grade of materials, falling back on technology, and will be reaching things like the present enrichment. That's been the tendency in the past fifty years.

If, on the other hand, as Mr. Joralemon says, the world is a "have-not" world, well, I can go along with that, if you want to take a long enough projection, but where does it leave you? I'll tell you where it leaves you.

The Lord laid down these enrichments of materials with a miscellaneous hand here and there, not because of any international boundaries, but let's assume, not in twenty-five years, but in fifty years or a hundred years the world is a "have-not" world, or that we are moving there rapidly, so you are going to say, "No, we must look toward the interruption of the increasing standard of living of America." Then the problem is even far more serious than the Commission has said, and we ought to take much more vigorous steps.

There was a small point which Mr. Joralemon touched upon, which is, do we flatten out our curves, or have we regenerative periods in our economy? I completely agree that the history of 300 years, judging if you wish, first from the British Empire which had the longest statistical record, is that you do have definite regenerative periods. Unhappily, most of them come after the inventive periods of war. They last on the average of 25 or 30 years, and then mankind resumes conflict, and the regenerative period fans up again. You do have the flattening periods, but over the broad thing, you have a trend line, which when smoothed out over generations, shows a normal, even gain in increased consumption.

I hope the question of the "have-not" world is very, very far removed, and that it will be a century or two before we will have to deal with it.

Mr. Joralemon: I think the Commission's report itself makes it clear that the world resources could not sustain anything approaching our standard of consumption for everyone. Since that is so, I still think that we are expecting a great deal to continue to increase our consumption by more than the increase in any other part of the world.

Mr. Strauss: I think that if we could, we ought to use the expression that Mr. Young suggested of a "need-more" nation instead of a "have-not." Why don't we all agree on that? I think that's a good way of putting it.

Since I was rather critical of some of the things the Commission had to say, I would like to side with them on this particular issue. I think that Mr. Joralemon is confusing the world as he would like to have it with the world as it is likely to be, and it is my impression that the job the Commission had to do was to describe the world as it is likely to be in 1975.

Now, he mentions specifically the statistics on copper. I think he said the underdeveloped countries are using a third of a pound of copper per capita now and might be using a quarter of a pound per capita more than that by 1975.

What is likely to happen is what we are discussing, and my guess on that particular point is that the Commission is right; that the rate of consumption of copper in the underdeveloped countries will increase very slowly on a per capita basis as compared with the probable increase here.

Donald H. McLaughlin: I believe the dispute is whether one takes a human or geological point of view toward the centuries in hand. No doubt, we are going to be a "have-not" world geologically because we are eating up ore deposits geologically at a fast rate of speed, but I don't think that is going to speak for the human point of view.

Hon. HENRY C. DWORSHAK (*U. S. Senator from Idaho*): I want to commend the members of the Paley Commission. I think they have rendered worth-while service. I don't know what finally will be done with this report, but I do think that it has been stimulating to all those interested not only in mining, but in the natural resources of our country.

I think it is my responsibility to inject what might be called the political aspects of this panel discussion. I realize, as you do, that finally the report will be submitted to the Senate and to the House of Representatives for hearings and for discussions.

What reception will Congress give this report? We don't know, but it will be a challenge to the legislative branch of Government, and whatever emanates from the hearings to be held in the next session of Congress will have a beneficial effect upon policies and planning which may have far-reaching effect not only in national preparedness, but in utilizing advantageously and to the maximum extent those natural resources with which our country is blessed.

I tried to analyze some of the recommendations of the Commission which undoubtedly will attract the attention of Congressional hearings.

The Commission in the interest of expanding world trade seeks to justify repealing our tariff laws and the "Buy American Act," and then without any supporting evidence, contends that a device such as the International Materials Conference will remove barriers to trade.

The International Materials Conference was never authorized specifically by the Congress.

I think that the State Department deliberately circumvented Congressional mandate, and I question whether the Government is authorized to permit this U. N. agency to thwart free trade.

In addition to recommending elimination of tariff barriers, the Commission believes the Reciprocal Trade Agreement should be carried forward and its authority expanded.

I happen to be one of only two United States Senators who voted against this on the occasion of extending the Reciprocal Trade program within the past year. But, it has always seemed to me that it has been a one-way program. Very infrequently has the United States been able to get any material benefits through the operations of the Reciprocal Trade program.

The Commission recommends legislation to authorize unilateral elimination of the import duty on any industrial material whenever such action is in accord with the national interests.

Such tremendous power in administrative agencies would jeopardize free enterprise by subjecting a specific industry to the whims of Federal officials.

We have heard a lot of discussion about the stockpiling program. While we all understand the mandate of the Congress in setting up stockpiles of essential materials upon which we may rely when foreign production is no longer available or materially cut down, it is difficult to get agreement among those agencies in Washington representing the Army and the Navy and the Air Force and other civilian agencies of the Government.

In 1950 when prices of lead and zinc were depressed, we appealed to the Munitions Board to stockpile these minerals. There was no interest at that time, but when prices increased materially, the Government purchased these commodities. They were willing to pay more per pound for lead and zinc for the national stockpile, but when the industry was depressed and those minerals were available at low prices, there was little interest on the part of the Federal authorities charged with the adminis-



tration of the stockpiling program. The record is clear in that respect.

Many conclusions reached by the Commission are illogical and highly discriminatory because they would give preferential treatment to the development of mineral resources abroad. Chairman Paley in an interview printed in *U. S. News* recently said this: "We encourage the government to take actions aimed at creating situations favorable to private foreign resources development."

I refer you to many instances wherein the agencies of government in Washington are more concerned about making loans and manipulating production abroad instead of doing everything possible to encourage expanded production here at home.

This statement of Chairman Paley is an astounding one and reflects the basic philosophy and thinking of the economist. Why should our Government stimulate expanded production of scarce materials abroad while discouraging use of reliable sources at home? In case of global war, foreign shipments might be blockaded, and then we would be entirely dependent upon domestic production. If the latter has been neglected and essential minerals are not available, our national safety will be in jeopardy. Such policies overlook the likelihood that if we rely on foreign production, and our domestic resources remain undeveloped, and we face the monopolistic practices and price gouging such as occurred in rubber, tin, wool, and other commodities in the past, particularly in that period immediately following the outbreak of hostilities in Korea.

For example following Korea, when the armed forces needed additional woolen supplies for uniforms, in Australia the price of wool doubled within the space of a few weeks.

Too frequently that is the kind of cooperation we get from countries with whom we are cooperating to preserve a free world.

However, the keynote of the Commission's report is that emphasis be placed on stimulating production abroad. I cannot agree with such a conclusion while our own vast undeveloped deposits remain untouched.

If the United States should become a "have-not" nation dependent upon imports, it will be the result of inept policies which discourage maximum use of American ingenuity and capital in the domestic mining industry. This is no time for a partial or full surrender to the prophets of doom.

Howard I. Young: With reference to the Senator's remarks on stockpiling we are doing what is set forth in programs, and when the defense authorities and the civilian requirements are met, why we have to quit spending the taxpayers' money. That is an unfortunate situation, but that's the way we have to function. I hope it will be cured some day.

Mr. Bunker: It seemed to me that you might possibly have had the impression when the Senator spoke that we disagreed with him on stockpiling. We have written about this. The Senator said he had not had an opportunity to read this report. We have an extensive, complete report on stockpiling, and we are quite frank. We say the program has been handled very badly. We think those charged with this duty did not buy when they should have been purchasing at low prices. It has had a long history of inadequate appropriations. We think the perfect time to buy is when industry can supply, and we find ourselves in complete agreement.

EVAN JUST (Vice-President, Cyprus Mines Corp.): Turning to the particular aspect of the report on which I was asked to comment, namely, its tax recommendations, it should be a source of great satisfaction that the Commission has embraced almost entirely the remaining points of the program toward which the American Mining Congress, the National Minerals Advisory Council

and many individuals have worked for many years. With such forthright endorsement of "incentive taxation" and of percentage depletion from such a source, we can expect a respite from the persistent attacks on percentage depletion which the White House and Treasury have conducted every time Congress has revised the Revenue Code.

In recommending that the limitation should be removed on the amount of exploration costs which can be treated as expense, the Commission has sponsored one of the most effective remaining possibilities of stimulating exploration. It is to be hoped that Congress will will act on this suggestion as I am sure all agree that the public interest would be served by an increase in domestic exploratory activity.

The Commission is also to be commended for urging certain new incentives toward American investment in foreign mining. The growing needs of our national economy point up very strongly the desirability of commercial control of raw materials we need from abroad.

If Congress adds the tax recommendations of the Commission to the substantial ones already embraced within the Revenue Code, it will be appropriate to ask ourselves if there is any reasonable basis for seeking additional incentives taxwise. I do not see how we can do so on a basis of equity among taxpayers. Thus, the only criterion I can set up is to ask if the level of investment in new mining and exploration ventures is compatible with the public interest, and, if not, are tax or other incentives the more appropriate?

As far as established, profitable mining companies are concerned, it seems to me that the addition of the Commission's recommendations to existing law leaves very little to ask in the way of tax benefits. Mind you, I am not referring to what you might term technical adjustments in the tax law which in laws of such complexity will always be a problem.

Further incentives, if there is to be equity among taxpayers, should come out of the prices asked for the output. No incentive is more effective than attractive prices for our output.

Considering that the established companies exhibit a preference for letting others conduct exploration in its earlier stages, further attempts to stimulate mineral development should be aimed at re-establishing an army of small prospectors and outsiders eager to tackle the hazards of early stage exploration. I think we will all agree that on the domestic scene the army which we formerly possessed has dwindled to a mere corporal's guard. Not long ago I believed that this was part of our economic maturity, but since I have had a chance to observe Canadian activity rather closely, I have come to the conclusion that this is only a partial explanation. Canadians and ourselves are very much the same kind of people. Canada has an army of small prospectors unique in the world today for its numbers and enthusiasm.

Canadian depletion allowances are less than our own.

The two features of tax law that seem to me to explain the differences I have noted are that Canada does not tax capital gains and it allows a three and a half year moratorium on new mines. Both these incentives are liberally administered.

The Commission considered the moratorium feature but dismissed it as unnecessary and too difficult to administer here. I disagree with this viewpoint on both counts, and I hope that the members of the Commission will give us some explanation of why the moratorium scheme was found to be unadministerable because it seems to be going along very well in Canada.

To restore that indispensable army of enthusiastic pros-



pectors and investors, I would recommend both a tax moratorium on new producing properties and a limited exemption from taxation of capital gains obtained through mineral exploration and development.

Probably these incentives would make the granting of easy prospecting money by Government unnecessary. I might add that the last statement does not indicate an opposition to the last point of view. If we can't get prospecting any other way, I think we should have it that way, but I would still have hope that the particular incentives that I have mentioned would restore that energetic interest on the part of small people and newcomers in early stage exploration.

Mr. Brown: Mr. Just asked why we considered the three and a half year moratorium unadministerable and unworkable. Canada has a population of eight or ten million people, and we have a population of 150 or 160 million people, and with all the arguments you get into on old properties with a new contract or a new operation, we could see a lot of difficulties, and that's the reason we dismissed it.

Mr. Just: It seems to me the answer there has to do with the attitude of the administrative agency toward the industry. The key to Canada's success in administering that feature of the law as well as the capital gains aspect is to resolve the doubtful situations largely in favor of the taxpayer. In other words, they are incentive minded there, instead of "restrictivist" minded, and to me, that makes a great deal of difference in the administration of a difficult law.

E. H. SNYDER, (President, Combined Metals Reduction Co.): I find that I got a lot of disturbing ideas out of reading this report. But Mr. Bunker and Mr. Brown tell me I didn't read it carefully enough, and that there is a vast difference between their conclusions, their statements as to what they believe, and their recommendations.

Now, I would have been far closer to the ideas of the Commission and a lot happier since I first read its report if I had read close enough to have ascertained that there was a very definite distinction between what the Commission believed, what the conclusions were, and what they recommended.

My paper was written before I was cleared up on these points, but I am going along with it pretty much, and then apologize to Messrs. Bunker and Brown for being a little bit rough in spots.

The speakers before me have given a few facts relating to some of the many good features of the report, and also alerted you to the fallacies that may be hidden in the long-range forecasts of the statisticians and the planners.

I may be overly suspicious, and in talking to these gentlemen, I think I was a little bit too much on edge.

I read U. N. and NATO and IMC, and I am just out of Mexico and that conference down there, and the attempt made to put over ITO, in all of these, the design and pattern is the same. It's to create a super-state where those furnishing 1½ percent of the money and men want to dictate to us who furnish 98-¾ percent.

I believe we should be grateful to those whose brains and energy went into the compilation of the report for the sole purpose of presenting comprehensive analysis of our materials situation, but we should crush fine, and screen dry for accurate sampling, the ground and theories planted in the report, especially schemes that would destroy our freedom, or the system which has built our great nation, and that could possibly substitute therefor the controls of a super-state.

Now, returning to some of the things relating to these

estimates. Using the definition that ore is mineralized aggregate that can be handled at a profit, ore reserves fluctuate within wide limits of the economic climate. They were seriously decreased by the recent drastic reduction in metal prices. Forecasting reserves in a single mine generally is a difficult task for engineers acquainted with the property even when fixed costs and prices are assumed. It will continue to be difficult until man develops instruments superior to anything we now have for determining the extent and grade of underground mineral deposits. There is no point then in analyzing in detail the opinions and guesses of those who made the estimates of the world ore reserves.

However, my experience in operating mines in several districts over a long period of time and an association with men who make estimates warrants my guess that the over-all reserves given in the report are probably less than 10 percent of those that can ultimately be mined.

The report generated no fear in my mind that the nation's economy will be seriously cramped for any period in the foreseeable future by shortages of lead or zinc, except those that may be created by unsound activities of government. Even if the consumption estimates for 1975 were realized, I think the Commission did a fine job, considering the task they had in getting some basis for forecasting the next 25 years, and you have all been alerted as to the variations there might be in those forecasts.

They were aimed purely to alert you to the fact that you had better keep track of your raw material problem. I know there is a wide divergence between those who wrote the report and members of industry as to what are unsound government policies. I am strongly opposed to international agreements that in any way limit our sovereignty, control our production or consumption or the prices of our products.

Foreign production, subsidized directly or indirectly by our Government, can ultimately destroy a large segment of our domestic lead-zinc mining industry, and place our economy at the mercy of foreign cartels or governments.

I agree with the Commission that the nation can ill-afford to condone violent fluctuations in metal prices, such as we witnessed during the past four years. I agree that buffer stocks might be a satisfactory solution to this problem, contrary to what some of my industry friends state. However, these stocks should be national, not international, and operated by regulations spelled out in detail by Congress; not left to the planners in the State Department or any other Government agency.

I think that Congress could define, using a commodity index, modified by the price of labor, the price at which metal should be bought and at what price it should be sold. Certainly I would not recommend under any conditions any agreement that involved international cooperation.

The peninsula of Europe without raw materials, with socialistic governments who, in spite of low wage scales, can't compete with us in the markets of the world, who really want to go to work and do a job, must find some way to get raw materials but not without paying what they should for them.

One of the problems of the world has been beating down the prices of raw materials producing countries by virtue of control of markets. I see in all of these plans a scheme on the part of the European nations primarily to beat down the prices of raw materials. The people who produce metals in the United States have that to beware of at all times.

Of course, you know this report is strongly opposed to tariffs. That is, it shows it in several places. May I call your attention again to the fact that a flexible tariff, established at a reasonable level would permit perpetuation of the domestic industry. Under such a system every marginal mine might not be able to operate at a profit, but the price set could be varied with the commodity index

(Continued on page 51)



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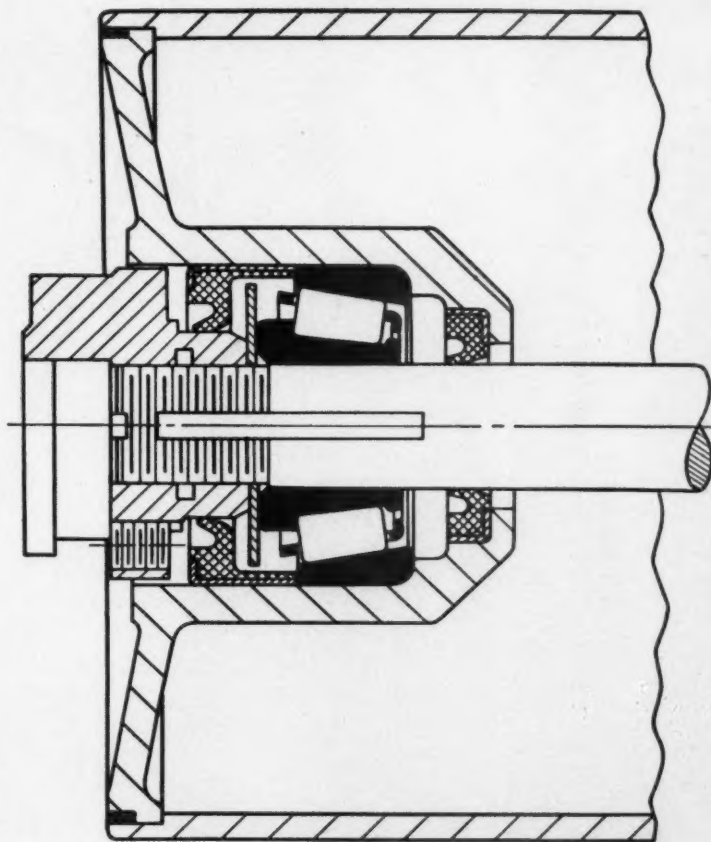
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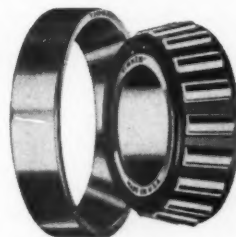
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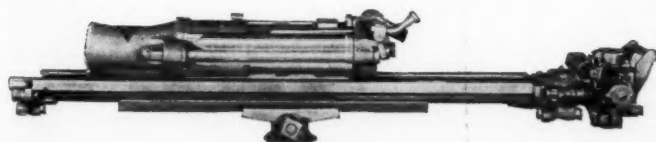
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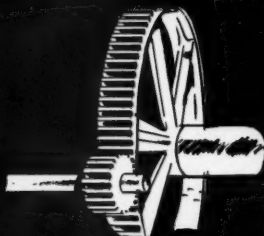
AMSCO TUBE TUNGSTITE (coarse particles) is best suited for applications requiring highly efficient cutting qualities, for hardfacing earth working and drilling equipment used for cutting extremely hard compositions, for hardfacing applications requiring a serrated edge and hardfacing certain types of earth working equipment or parts subject to extreme abrasion.



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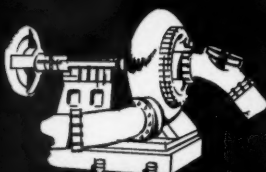
AMSCO V-MANG, bare or coated, for build up and repair on manganese steel castings exposed to impact; work hardens— $\frac{3}{32}$ ", $\frac{1}{16}$ ", $\frac{1}{8}$ ". Microstructure: austenitic manganese steel.

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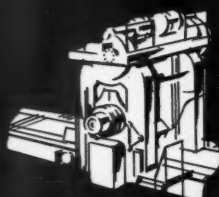
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The Paley Report

(Continued from page 46)

and the cost of mine labor, and not make it necessary for us periodically to shut our mines down, discharge our men, drive them out of the industry, and then get another shortage for our consumers. We are looking at a picture like that right now.

Zinc went to 13½ cents today after a drop of six cents a pound in about two months due to the laws of the jungle that have been used in the zinc market.

I read carefully the fundamental concepts of the report and generally agree with them, but before advocating the less cost principle, we should have an answer to the question, "Less cost to whom—the American taxpayer or the consumer of metals?"

I am fundamentally opposed to subsidizing consumption. The producer should get the subsidy, not the consumer. If we must resort to subsidies, they should be paid automatically to all domestic producers, preferably graduated with increments of production.

The Commission's recommendations as to loans coupled with collective price contracts provide an unfair type of competition for those who maintain production without government help, and the domestic industry may be seriously hurt by surpluses created by such devices.

Before closing, I urge all domestic miners of lead and zinc to analyze the Paley Report and to talk to their representatives in Congress.

Mr. Fletcher: In further regard to what Mr. Snyder said, I know he was under a misapprehension, and I think a great many people will be under the same misapprehension when they read the statement such as this on page 90 of the report under the title, "The Commission Concludes." It reads:

"The Commission believes that on balance the international arrangements that hold the greatest promise for stabilizing materials markets and at the same time for promoting the increased production of materials that the future will demand are the multilateral contract type of agreement and buffer stock agreement either without or with quota provisions on exports or production."

I think it would be well if Mr. Brown would explain to us the difference between what the Committee means when it says "believes" and what the Commission means when it says "recommends."

Mr. Bunker: We have said all the way through the report, that we are dealing with a great many problems to which, frankly, we did not feel we could bring the issue to any such point as recommendation.

Mr. Strauss commented this morning on the international aspects of the report. However, he read only the digest of the international report in the first volume. The expanded treatment of that question goes on to say there is an immensely difficult problem, and we don't know how to cope with it. It's a problem for this sort of Congress or some other group, and I am sure you will all agree that you have a great problem of how best to get at the cheapest level of import of materials.

The only conclusion we can reach, that the best method—we don't suggest it is a good method, but we suggest it's the best method we know of—is some of these international buffer stocks, multilateral agreements, and then we go on to say very carefully that we think these methods should be explored on a test basis.

Mr. Fletcher: I just wanted to bring out that where the Commission says, "We believe," there is a great difference between what they believe and what they recommend. Now, I gather that the only thing we really have to be worried about are the recommendations in italics, and where they say "believe," that implies it may or may not be a good idea.

Mr. Bunker: When we come out and say "recommend,"

this is what we mean. We say we recommend—you do precisely this: You give a man the right of requesting a leasehold or filing a claim. It is clear and precise and it's what we conclude. When we say we don't know how to solve the thing, and this may be the best method, and we think you should explore it, it's a long ways from "You should do something." And we say "explore it on a test case," I think that's good, clear English and has nothing to do with the recommendations of action otherwise than to explore for test purposes.

Mr. Brown: I think every person who reads this report will find "believe" and "recommend." But you can readily see where you have five on a Commission that you have a lot of differences of opinion. We wrote a lot of the pages that you are reading, and where we couldn't come to complete agreement, we did not recommend. We simply said, "We believe." If you will read the report with that in mind, I think you will see that this controversial thing we have been talking most about today is not a recommendation by this Commission, and we did not in any way intend for it to be a recommendation.

Mr. Strauss: I think this has been very enlightening, but in order that the Commission on its part may feel reassured on the question of whether there is any subtlety in the mind of this particular commentator who discussed this problem, I would like to say I do not believe, I do not recommend, and I do not conclude that there ought to be an international buffer stock.

In other words, I believe that our industry should make it amply clear that if there is this difference of opinion in the Commission that this is a dangerous thing. I believe it to be a dangerous thing, whether the Commission wholeheartedly recommends it or just tentatively advances it. It's a far more serious commitment than a tentative exploration.

The first time you try this thing, you are opening the wedge for every nation that might feel it would redound to its advantage to press hard for similar arrangements in other materials. It's a precedent which, once set, cannot be easily unset, and I think for myself that it should be fought tooth and nail from the outset. The concept of an international buffer stock is anathema to me.

Mr. Snyder made an interesting observation, I think, that that recommendation is something which perhaps this group will want to consider as an alternative. I think it's a mistake if all of us take a purely negative attitude on the recommendations, beliefs or conclusions of the Paley Commission. I think we must offer something as an alternative to what they have set forth in their report, and



We now import iron ore from Liberia and other foreign countries

whether Mr. Snyder's plan offers a way out or not, in which the industry can concur, I don't know, but I think if we do something to set up a group within the Mining Congress that will make a continuing study of what the Paley Commission has reported, come up with alternatives in which the industry as a whole is generally agreed, I think we will be doing a part of our duty as citizens as well as our duty as mining men.

DONALD H. McLAUGHLIN (*President, Homestake Mining Company*): For quite a few years now I have been chiefly involved in the production of a particular metal, and have been very much interested in some of its problems, so you can imagine the shock and the dismay it was to me to read the Paley Report and every now and then see in a particularly important place the little phrase, "except gold." Now, why the Paley Report should ignore the metal that is our most strategic metal is beyond me, but they did.



I was rather surprised that in the Paley Report more emphasis was not placed upon the need for an international monetary system based on gold as one of the very best methods of stabilizing international trade, correcting chaotic exchanges and really promoting the ends that we all have very much in mind.

The Paley Report performs an important service in directing attention to the major changes that have taken place in the nation's economy with regard to the production and consumption of raw materials. The significance of the transition from being an exporter of minerals and metals to dependence on imports for a critical part of the supplies needed for our expanding industry is still not appreciated or generally understood.

This is a very profound change and one that is likely to require considerable modification of procedures with regard to international trade, tariffs, and mineral policies from those that were satisfactory in the past.

There is also danger that the exaggerated consumption, or better, destruction, of resources in the current decade of war and extravagance has provided a false concept of normal growth. Indeed, I rather fear that when the rearmament effort becomes less demanding, we may be faced with over-production of metals and minerals for a time, which would be extremely troublesome.

However, these points are not advanced to indicate doubt about the general view of the report, namely, that our growing industries are certain to consume more metals, minerals and oil than can be supplied from domestic sources and that our dependence on foreign sources for such materials, with a few exceptions, will not only continue but grow.

With regard to the conviction that growth is a basic principle of the American people, I would agree, but with the qualification that growth may take various forms. Bulk of output and consumption is merely one. We should be equally mindful, however, that growth may be expressed by improvement in quality and in efficiency, in new discoveries and inventions, in wiser use of available materials and in maintaining a better balanced economy. Unless these aspects of growth are stressed, there is no end of growth ahead, except eventual exhaustion.

With the affirmation of belief in private enterprise as the most efficacious way of performing industrial tasks in the United States, we will surely all agree, even though some of us may think that this concept was not consistently followed in all the recommendations of the Commission.

The recommendations with regard to fact-gathering and analysis on the part of the Geological Survey and the Bureau of Mines and on the part of industry through the AIME deserves thought. If kept within reasonable bounds

and costs, it could be a useful extension of services now provided. The advisability of a professional society such as the AIME accepting such an assignment is open to serious question, but a committee has been appointed by the Institute to study the matter, and I can assure the members of the Commission it will not be dismissed lightly.

Added support for the Geological Survey is to be commended. Mapping, both topographic and geologic, should be carried on at a faster rate. More district and regional studies of the geology in sufficient detail to be significant in relation to mineral deposits are certainly needed, as well as research in problems of genesis. The recommendation that a special committee be appointed to prepare an inventory of existing scientific and technical knowledge bearing on exploration is to be commended. I believe the National Science Board is giving serious thought to that recommendation at the moment. I would, however, wait the report of such a properly qualified group before deciding on any ambitious program of government directed research and development.

The recommendations with regard to the mining laws will undoubtedly arouse intense opposition. However, the mining community should not dismiss them and might even do well to advocate certain of the changes that are proposed. The abuses that exist are attracting more and more attention and if we do not show more inclination to correct them, others may do so in ways that might be far more dangerous than the proposals made by the Commission, or by the Committee on Natural Resources of the Hoover Commission.

Now, I think the Commission must recognize that when it recommends anything that would extend the leasing laws to the metal mining industry, it's sure to arouse opposition. It's really not because the mining industry could not work under leases, but there is a fundamental distrust of leases on the part of the metal mining community, and probably a justified fear that they might be used to provide a way for the bureaucrats to impose more and more restrictions on the operation of the leases.

The right to hold an adequate area by an exploration permit while prospecting is in progress, the requirement of more formal recording of claims, and a more reasonable definition of discovery particularly for obtaining a patent, seem to me to be points that might be covered in revisions of the law, and I feel that many of the other recommendations with regard to revision of the law surely deserve our very thoughtful consideration. They certainly should not be dismissed in any light way.

The recommendations on tax policies are excellent and I am sure will be emphatically endorsed by the mining profession.

The Commission's views on foreign investments and international trade are open to many serious objections.

Elaborate provisions for scientific and technical studies carried on by agencies of our Government in foreign lands, for financing ventures too risky even for the Bank of International Settlements or the Export-Import Bank to entertain, and for active government participation in exploration and development of foreign mineral deposits all seem better designed to dissipate American wealth than to attain any significant quantities of metals and minerals at reasonable cost. The control of prices and the negation of free market competition by various devices such as international buffer stocks are likewise unnecessarily complicated. Exploration and development of mineral resources by American capital in foreign lands, balanced international trade, and the securing of the desired supplies of metals and minerals from abroad can surely be accomplished in much simpler ways consistent with our concepts of free enterprise. There an international monetary system based on gold would be one of the very best tools we could have.

With the recommendation that stockpiling of strategic and critical materials be made a permanent instrument of the national minerals policy I am in complete agreement. Not only does it provide protection against disastrous

shortages in case of blockade in time of war, but it also affords one means of increasing our imports without disrupting our domestic economy and thus obtaining some return for the wealth in various forms that we have sent and are continuing to send abroad. The policy of supporting such unbalanced trade through loans, or undisguised gifts, at the expense of the American taxpayer can't go on indefinitely. There is a limit to our resources, if not to our stupidity. The only way we can be effectively paid is in goods. We don't need many services and the good will we thought we were buying is pretty intangible. Consequently, I see nothing but benefit in the long run to our economy by buying, bringing in and storing all the mineral wealth we can obtain from others without disrupting the normal economy of friendly nations. The materials should be obtained under reasonable competitive market conditions with proper advantages taken of all factors favorable to us. In fact, I endorse very heartily a national buffer stockpile.

With purchases stepped up when materials are abundant and curtailed when they are scarce, unless under emergency conditions and with the stockpiles held inviolate for needs in the distant future, I see no reason to fear that dangerous bureaucratic control of markets would result from such a policy. In the end we might succeed in building up a reasonable depletion reserve to offset in part the mineral resources we have squandered in the wars and in our fatuous efforts to win friends through gifts without the *quid pro quo* that commands respect.

HORACE M. ALBRIGHT (*President, United States Potash Company*): My own view of the Paley Commission Report is that it is one of the greatest accomplishments of a government agency in many years, certainly since the war. I regard the Commission's Report as a repository of facts, really encyclopedic in scope, and of the utmost importance to government, industry and agriculture, and for years to come.



I believe in the three fundamental concepts which guided the preparation of the report: First, the principle of growth of our country and its economy; second, private enterprise as the most efficacious way of performing industrial tasks in the United States, but with recognition of the fact that government is going to have some hand in guiding, even helping private enterprise, and that we in business not only know this is necessary, but at times ask for it; third, that we are concerned with the affairs of other countries of the world, especially the free world, with their materials, with their trade, and with their standards of living. I believe we are in need of materials from foreign countries, and that these requirements will increase, not diminish. I even think that improvements can be made in the mining laws and regulations regarding administration of public lands.

I want to see our own mineral supplies increased and our own mining industry grow, flourish, and prosper. I believe these three things will happen, but not fast enough to meet all our needs for metals and minerals. In my opinion, it would be a grave mistake for us to give too much attention to the impact of this report in a year or five years from now on our industry or on the economy of the nation. This is a study of the materials situation for 25 years. The Commission was charged with the responsibility of arriving at general conclusions regarding our economy 25 years hence in the light of our supply of materials available, and then had to be very objective and could not bring in recommendations that in every respect would seem reasonable to us in the light of our situation today. The Commission has done a magnificent job, written a



Our growing industries will consume more fuels, metals and minerals than ever before

superb, scholarly report, the very language of which commands respect aside from the scope and meaning of its words.

The report becomes at once a basic document certain to influence industry and government policy for many years to come.

As we have seen today, most, if not all of us here in the panel and in the audience, disagree with some features of the report, especially some recommendations relating to foreign trade policy and government controls, and some phases of government in industry.

I commend to all of us the editorial in *Mining Engineering*. This fine editorial insists that the Paley Report is a starting point, "for the formulation of policies which must be continuously revised to meet changing conditions." With this statement, I agree absolutely.

I want to urge our officers and directors and our members, especially our officers and directors, who have to do with the management and government of this great Mining Congress of ours, seriously to consider the establishment of a committee, a continuing one with changing membership—but with a consistent policy—to study, analyze, assemble more facts, keep the report up-to-date, also, to suggest revision of conclusions and recommendations as the need arises through new situations and new problems. This committee should be one from our own mining membership appointed by our president, but if that is not feasible, then an outside group of mining men, perhaps like that which was organized but not under government auspices, the Mineral Advisory Council.

If we do not do something like this, government will make strong efforts to apply and enforce features of the report with which we do not agree and with which we have never been in agreement and might never be in agreement.

In conclusion, I say, "Don't let the Paley Report die," but in keeping it alive and vigorous and strong, we want something to say about the sustenance it gets. We want a hand in its bringing up. We want to feel when it is 25 years old in 1977, it will be especially strong because we fed it sound mining industry wisdom, year by year.

PHILIP BRADLEY, JR. (*President, Pacific Mining Co.*): What agency and activities of the Federal Government will in the immediate or near future be guided by the Paley Report?

Howard I. Young: I would say this. As far as I know, the NSRB will make the final recommendations to the President for implementation of it. The final carrying out of the policies will remain to be assigned.

Question: How long will it take to complete adequate topographic and geologic map coverage of the United States?

Mr. Joralemon: Some of the Geological Survey people say that at the rate at which it is going, it will be somewhere between 100 or 200 years.

Mr. McLaughlin: Of course, that would involve remapping a good deal of the mapping that has been done in the past, so it will never cease.

Mr. Bunker: We made an estimate that at the present rate it would take 100 to 125 years, and following our recommendations for expediting, a good deal of it could be done in 50 years.

JOHN EVANS (State Department): Do you think that price stabilization would increase or decrease new private investments in mineral production?

Mr. Snyder: What I mean by price control is not a fixed price, but one that would float with the supply and demand within limits controlled by the commodity index and the cost of labor in domestic mines.

One of the worst drawbacks at the present time is the hectic market we have had over the last four years. A variation of 30 percent in 60 days brings terrific losses to both consumers and producers of metals. In the old days we didn't have that due to the fact that we had a tariff that was one-third of the market price. Now we have an insignificant tariff of about four or five percent. Any scheme that will automatically stabilize and not re-

quire administration by men would be a fine thing for both domestic and foreign mining.

Question: Is the lead picture now or in '75 black enough to justify further governmental encroachment and/or socialization including the currency involvement in a world buffer stock?

Mr. Snyder: The answer is no. There isn't any shortage of lead and not likely to be.

Question: Why not let the private metal companies respond to future requirements and leave the government out of it?

Mr. Bunker: There are an awful lot of things that private industry will not do, is not doing, and have no intention of doing. Private incentive isn't big enough. We say someone should do the research necessary but there is no incentive. The minute private industry will take it over, let them take it over, but there are a great many things that have to be done and must be done for national security.

Otto Herres: If the Commission looks for high prices and shortages, why does it recommend international agreements and the devices used by foreign nations and cartels to limit production and maintain high prices by eliminating competition?

Mr. Brown: We don't recommend that, any phase of it. He must have read a summary to get all of this.

Mr. Herres: I just read the "beliefs."

Mr. Brown: I don't believe you did, because there is no place in there where we recommend any one of those three things you said, none of them.

Mr. Herres: There is some place in there where you say you believe—that's what confused me.

Training for Mobile Operations

(Continued on page 34)

thus bringing about a more satisfactory maintenance experience.

Second, the men were given uniform training so that a foreman who received a permanent or temporary man from another section was assured that the relief man would operate his machine in the same fashion as the regular operator.

This system of training has aided immeasurably by making each foreman more critical of the work he supervises. For the mine as a whole, expected production was realized, while favorable trends in safety and cost were maintained.

Bad Habits Corrected

To complete the expansion program, the team was used to train men on the sections which were operating before the expansion. These sectional crews were given training identical to that given new crews. As is usually the case when training experienced men, the team was faced with the problem of correcting acquired work habits which did not conform to the job breakdowns.

After crew training was finished, the team made periodic checks to see that men previously trained were performing in the prescribed, safe man-

ner. This insured a better performance from the safety standpoint and insured standard work performance on each operating section.

Since the expansion program has been completed, the training team has been used for special training jobs. The team members have given Job Relations, Job Instruction and Job Methods Training courses to the mine supervisors during the weekly supervisory training meetings. They have also given this instruction to supervisors at the other company coal mines.

One special job involved the inauguration of sectional roof bolting at another TCI coal mine. That the training team did a thorough and effective job is evidenced by the fact that six sections on triple shift were started within as many weeks, with an over-all gain in unit performance on those sections. An added observation is that no one was injured, even slightly.

Method Most Rewarding

Experience with the training team's approach to safety has been most rewarding. It has proved that by making safety an integral part of the training program and by placing safety foremost during the training period, expected production, along with a high degree of safety, can be realized in a short period. Being specific about safety, as is done in

the job breakdown, is far more effective than generalizing about safety.

The training team approach helps to build safety into the employee in the same manner as safety is built into a piece of machinery. With mining equipment, mine design and mining practices being engineered to produce excellent safety conditions, the factor of human safety engineering must not be neglected. The well-known safety slogan is still applicable—"The best safety device known is a safe workman."



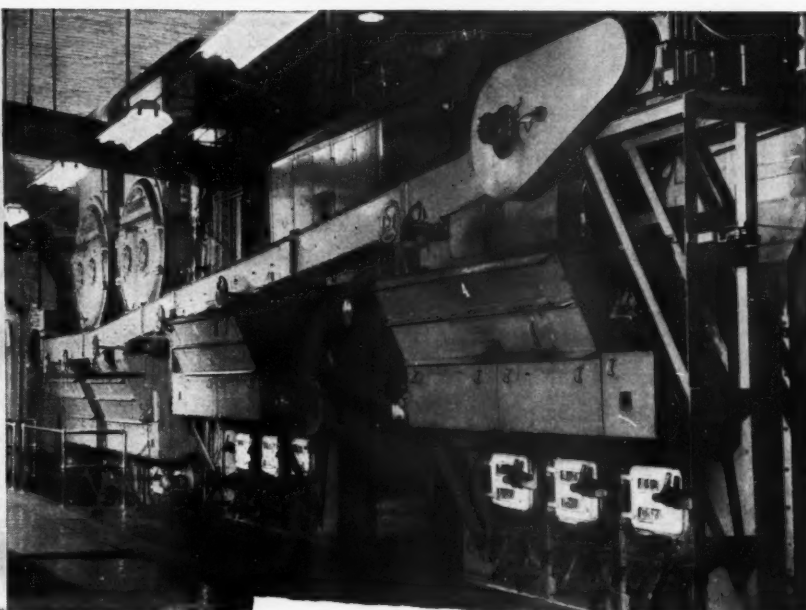
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Permanent trailing cable repairs are made in the shop

Cable Repairs and Leak Detection

Preventive Maintenance, Education and Careful Repairs Mean Lower Cost Mechanical Mining

By C. E. WISSINGER
National Mine Service Co.

SINCE the early days when the electric motor driven mine machine and cable reel locomotives were first used, a trailing cable has been necessary to supply the power to operate them. The cable has always presented operating problems, particularly with respect to its physical limitations and proper maintenance. The earlier type of trailing cable, and it was used for many years, was known as Seine twine braid. It consisted of rubber insulation over the conductor which was protected by a jacket made of woven linen cord braid saturated with a water repellent compound. About 25 or 30 years ago, the rubber jacketed construction, much as we know it today, was placed on the market. While its superior quality was recognized from the beginning, the cost was higher than the Seine twine construction.

This prevented it from being generally adopted for several years. Gradually, as more operators found from experience that the increased cost was justified by superior performance, the rubber jacketed construction finally predominated. It has now been some years since Seine twine braided cable passed into history.

First, Prevent Damage

As mechanization in the coal mining industry has continually increased, the use of trailing cable has kept pace with the trend. The increased importance and use of trailing cables has made the problem of maintenance one of paramount importance. A proper maintenance program should start where all good maintenance begins—with preventive maintenance. Such a program should begin at the

coal face. Depending on local conditions and the type of equipment used, standard practices should be set up. This can best be accomplished by educating the men at the face, particularly through face bosses.

To illustrate, one of the preventive maintenance maxims that can thus be stressed is, "Do not snub cables around sharp corners or objects of too small a diameter." This is especially applicable where the cable is subjected to severe tension or jerking that would be transmitted to the point where the cable is snubbed. Excessive tension on shuttle car cable reels can quickly damage or destroy cable. Impress upon the men at the face that proper handling of the cable will im-



Jacket of repaired cable is vulcanized on



Small breaks in insulation that do not show on outside jacket are potential sources of dust or gas explosions

prove the safety of their section and also increase tonnage, due to less downtime.

In gassy areas where permissible equipment only can be used, a short circuit in the cable might cause an explosion. A short circuit could also set off a dust explosion under proper conditions. An educational program emphasizing points like these will prove to be one of the most satisfactory and least expensive approaches to the problem of cable maintenance.

Make Temporary Repairs

Even though a workable program of education is established, there will still be a certain amount of damage to the cables due to accidents that are seemingly impossible to eliminate entirely. When the cable damage requires only temporary repairs, a standard procedure should be set up for making them. Most mining men are familiar with one or more satisfactory ways to make temporary splices in the conductors. Insulating materials should be available so that any temporary repair can be properly insulated and waterproofed. At least one state now has laws limiting the number of temporary splices permitted in a trailing cable. Other states are considering such laws and no doubt within a few years such legislation, either Federal or State, will be common. When a cable has been damaged repeatedly and the maximum allowable number of temporary repairs installed, it must be removed and permanent repairs made. In all cases where laws or regulations cover these repairs, a vulcanized jacket on the splice or repair is required.

Braze Conductors

Several years ago, our company set up facilities to make permanent repairs to cables. In the beginning the conventional method of joining the conductors was followed. As a result, repaired cable had a greater outside diameter than the original cable. To overcome the shortcomings of this method, careful study was given other possible methods of joining the con-



Brazing broken conductors permits a repair of same diameter as original cable

ductors without increasing the diameter at the joint. A procedure was developed which produced a finished splice with the same diameter as the original cable. The joint in the conductors is made by brazing. On tension tests we have made, we find that it is possible to obtain a tensile strength equal to 90% or more of an

unspliced portion of the cable. This type of braze requires considerable skill to keep the joint as short as possible and not damage the copper by overheating. After the conductors have been brazed together, the brazed portion does not exceed $\frac{1}{2}$ in. in length.

(Continued on page 63)



When all breaks have been fixed cable is carefully tested

Trends in Hollow Drill Steel

What Problems Does the Use of Alloy Rods Bring and How Can They Be Overcome?

By W. H. McCORMICK

Chief Metallurgist, Park Works

and

R. W. PERSONS

Hollow Drill Steel Sales Manager

Crucible Steel Co. of America

ALMOST all drilling today is being done with some form of detachable bit or with rods in which carbides are inserted in the steels themselves. This reflects a trend which has been in progress for some time and which indicates that the mining profession is using smaller sizes of hollow drill steel, and most significant, that it is increasing its requirements for alloy hollow drill steel.

In compiling the following figures, hollow drill steel used by the construction industry has not been separated from that used by the mining industry. While this prevents fully illustrating impact of the figures on the mining industry it was not possible to make the separation. The figure illustrating the trend toward the use of alloy hollow drill steel is based on data available from many sources and is in terms of tons of drill steel used. At the present time there is very little alloy hollow drill steel being used in the construction industry.

Emphasis throughout the industry is on smaller drill holes which require

the use of smaller bits and, consequently, smaller hollow drill rod sizes. The construction industry, particularly in heavy contracting work, uses large quantities of 1½-in. round hollow drill steel. If the steel used in the heavy construction industry is disregarded, the trend to smaller sizes in mining would be more pronounced. In Fig. No. 2 the data have been converted from tons or pounds to lineal feet better to illustrate the trend. There is an exception to the trend in the case of the one-in. quarter octagon. The indication is possibly that as alloy drill rod becomes more popular, there is also a trend toward standardization of section; for example, where both one-in. quarter octagon and one-in. hexagon have been used in the past, only one-in. hexagon is now being used.

In the middle 30's when detachable bits were new, a great deal of 1½-in. and one-in. round hollow drill steel was used with one-in. hexagon or ¾-in. hexagon shanks. There appears to be a definite trend away from this

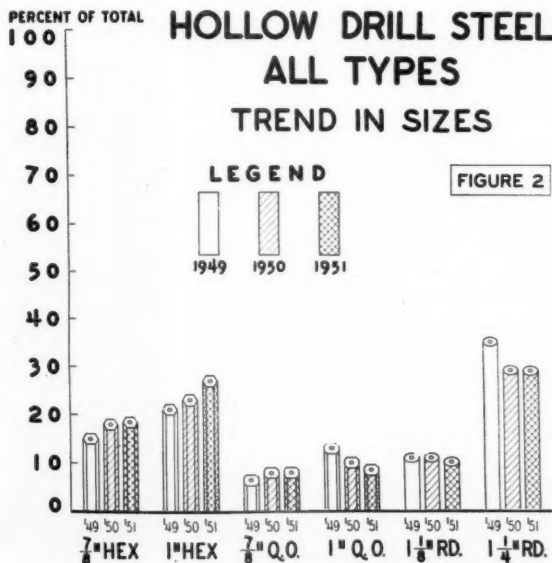
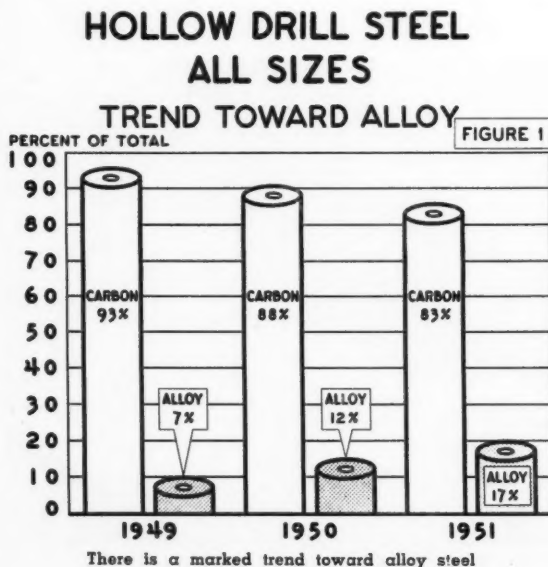
practice, but round sections are more logical than hexagons or quarter octagons for a drill rod. Is this trend only because of the fact that it is a little more difficult to forge such shanks?

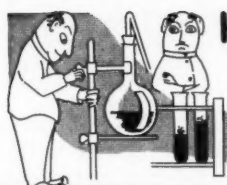
New Problems Introduced

Introduction and wide acceptance of the carbide bit and the one-use or throw-away bit, and the integral or inserted carbide tip has introduced many new problems for the steel maker as well as for the rod fabricator. In many instances the conventional carbon steel has been found entirely adequate. In others, an alloy drill rod is indicated.

Crucible has made and tested drill rods from over fifty different alloys and steel makers still do not have the all-purpose alloy steel rod which will lower drilling costs without any more fuss or bother in fabrication than customary with carbon steel. Further, just because steel has alloy in it there is no reason to assume that it is going to be any better than carbon steel. It must prove itself in each new location.

Aware of new demands on hollow drill steel for several years, it was decided in 1949 to make a complete summary of what was known about the product. Field men, research men and operating people at the mill were asked to help evaluate the existing steels. There were four general types which had seen sufficient field service to provide accurate data. These were the Carbon steel, the Carbon Vanadium, the Chrome-Nickel-Moly type and the high Carbon, high Chrome, Moly type. For reference these will





HOLLOW DRILL STEEL TYPICAL CHEMICAL ANALYSES

FIGURE 3

Steel	C.	Mn.	Si.	Ni.	Cr.	Mo.	Va.
A	.80	.30	.15	-	-	-	-
B	.80	.30	.15	-	-	-	.20
C	.30	.95	.25	2.25	.70	.30	-
D	1.00	.30	.25	-	1.35	.35	-
E	.25	1.00	.70	.30	2.15	.30	-

Data deal with five types of steel

be called steels A, B, C, and D. Also included is a new one (E) which looks promising but about which there is still a lot to learn.

In this survey, field people were asked particularly about fatigue life, wear resistance, straightening problems, forging, cooling after forging, machining and heat treating.

Strength Alone Not Enough

Then the production problems were considered. Did mill controls have to be such that it was impractical to produce the steel? For example, the steel billets have to be drilled and cores inserted prior to rolling. Core welding during rolling and rough inside walls cannot be tolerated. This study did show a definite trend, which more recent studies have substantiated. The mining industry can now use more complex alloys than it did a few years ago because it is equipped with better and more modern tools; better heat treating and tempering furnaces, for example.

It is pretty well known what most of the alloying elements will do in steel as far as their effect on mechanical properties. Fatigue life, strength, and hardness appear to be the principal considerations in a hollow drill rod.

Fatigue is the property that determines how many times a drill rod may be flexed before it breaks.

The word strength alone means nothing. In hollow drill rod the important concern is elastic limit, or yield point, because this is the property which determines the ability of a rod to resist permanent setting. It is the property considered by bridge builders, spring makers and designers

of structural members. *It does not mean stiffness.* Here is what the Society of Automotive Engineers (S.A.E.) says regarding the selection and use of steel, "The steel user should also remember that the elastic deflection under load of a given part is a function of the part rather than of composition, heat treatment or hard-

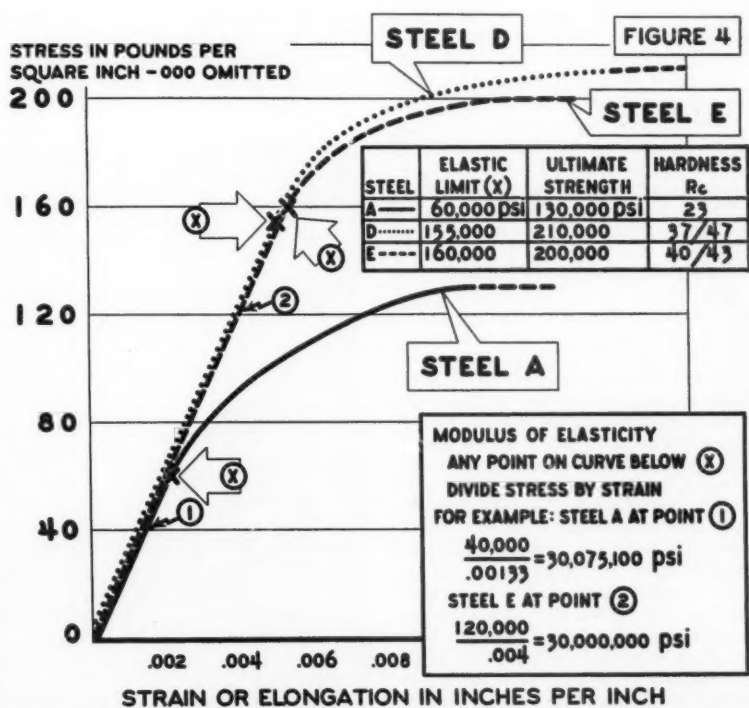
ness of the particular steel being used."

In the typical tensile test or stress-strain curve of two of the commonly used drill steels and the new "E" steel, note that stiffness or modulus of elasticity is stress-strain. At any point on the curve of any steel below its elastic limit, the ratio is always about 30,000,000. This means simply that the heat-treated steels or the alloy steels, as obtained from the mill, might have a higher elastic limit or yield point, higher tensile strength and higher hardness but they will all have the same degree of stiffness. *If you decrease the cross section you will get more whipping no matter what steel you use or how you heat-treat it.*

Rigidity or stiffness can only be improved by increasing the cross section or making rigid shapes like channels, I-beams, etc. For roof supports or bridge members you use beams. You don't just take round or hexagon bars and alloy them or heat-treat them to a higher hardness. Similarly, when you need rigidity in drilling there must be no compromise with cross section. Don't use a 3/4-in. hexagon alloy when you have been using a 1 1/4-in. round carbon drill rod unless you can put up with more flexing, less stiffness.

Hardness vs. Abrasion

Hardness is an important factor. There is a lot we don't know about abrasion resistance but, generally speaking, the higher the hardness the better the rod will withstand rubbing



Regardless of physical characteristics modulus of elasticity is about the same



UPSETTING OR "PEENING" TEST USING PURPOSELY CUPPED ANVIL

FIGURE 6

In general, mushrooming is a function of hardness

or abrasive wear. All of the hollow drill steels will be superior in this respect if the hardness is raised by heat treating, that is, by quenching and tempering all over.

A characteristic with which all of you have been concerned since the days of the hand held drill is the ability of the striking end and possibly the attachment end to withstand peening or mushrooming. By selecting the proper heat treatment of the ends, this can be prevented. The opposite and possibly more serious problem of chipping must also be considered. In an attempt to evaluate the ability of various steels to withstand mushrooming, several specimens were prepared. Their size was arbitrary. They were treated to the hardness and strength recommended for shanks. B. F. Shepherd, Ingersoll-Rand Co., had in his laboratory a device for dropping repeated loads which it was thought would tell something about this.

Using the block testing equipment to evaluate and test hollow drill steel, it was planned to correlate these results with actual rod end results. To do this a pronounced cup was purposely machined in an anvil block. This is a condition none of you, of course, would ever knowingly permit to occur.

Unfortunately, this work had just begun when it was interrupted and the results are not conclusive. It is hoped ultimately to determine whether the lower carbon alloy steels have a tendency to mushroom orpeen more than the higher carbon steels at the same hardness. Is this mushrooming only a function of hardness no matter what type of steel we consider? In general, the latter appears to be true if all of the steels under consideration have been heat-treated.

Shop people are interested in the relative ease of forging or upsetting. Here we encounter an inherent characteristic of the steel. Again, it can be compensated for by raising or lowering the temperature and increasing or decreasing the number of heats. In raising the temperature care is necessary because steel will coarsen or burn

if the temperature is too high. Using a rather wide range of temperatures, three of the steels noted above were upset in a conventional drill sharpener. In doing this every precaution was taken to insure uniformity. The load or impact, time in upsetter, etc., were held constant and only the temperature was varied. Results illustrated are self-explanatory. Steels of different composition must be heated differently.

Notice that if you compare the results with the steel maker's recommendations, the latter appear to be conservative. They are, because you can always reheat but once the steel is burned it cannot be restored. Comparing the carbon steel (A) with the others it is obvious that carbon hollow drill is comparatively foolproof. The alloys must be heated more carefully.

Machining must also be considered. There are many alloys that look promising from fatigue and abrasion resistance alone but which would require such an elaborate annealing

cycle that they don't appear to be worth it. Of the steels shown above, the higher Carbon Chrome Moly (Steel D) would be expected to require a little more careful handling. It is a practical alloy, however, because just a slow uniform cool after reheating following forging is usually adequate for machining.

What Are Stresses in Rod?

Some extremely interesting considerations have come up in recent years in working toward the improvement of drill rods. For example, just what are the stresses in a drill rod? Is the surface in compression or tension? Floyd Anderson of Gardner-Denver Co. has done some very precise work on this problem and his results are extremely thought provoking. He has shown that in high hardenability alloy steels the surface appears to be under compression whereas the carbon steels are under tension. This is very important because engineering designers of many highly stressed parts are in agreement that the surface, if at all possible, should be in compression. Compressive stresses in carbon steel may be produced by flame hardening the surface. They are also produced in many applications by shot peening or otherwise cold working. The classical example is the stressing of the bore of large gun tubes hydraulically.

In Steel D we encounter an interesting phenomenon that appears quite fortunate. A certain amount of carbon is lost during the processing of the steel and, under the microscope, we can see a rim of a slightly lower carbon. This lower carbon rim, upon cooling from rolling or forging temperatures hardens to a higher hardness because in this particular alloy

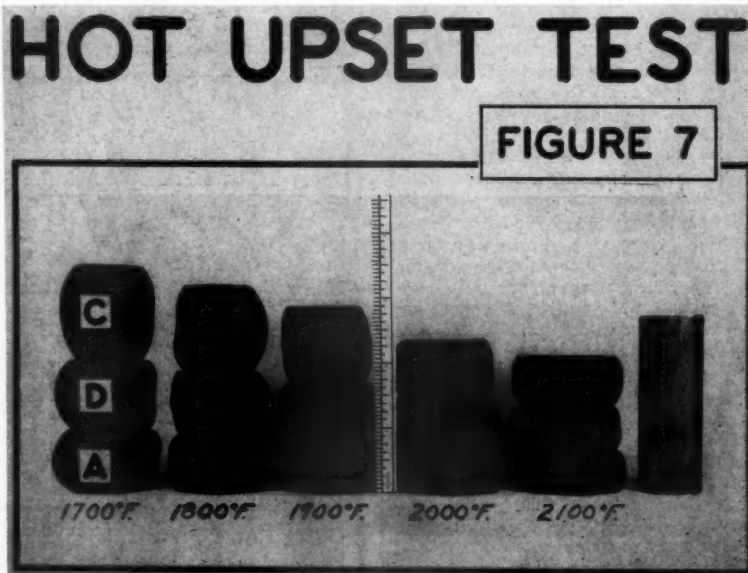


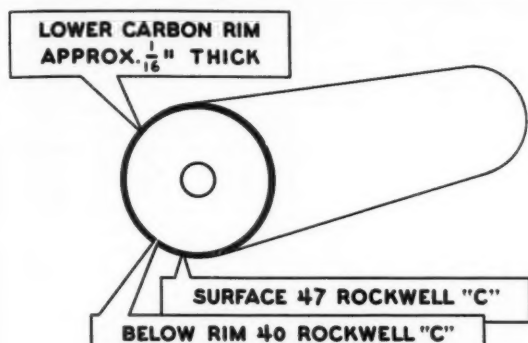
FIGURE 7

Different steels require different heat treatment

HOLLOW DRILL - STEEL "D"

HARDNESS AFTER 1600° F STILL AIR COOL

FIGURE 8



Surface hardening due to lower carbon content of rim

when the carbon exceeds about .70 percent, it has somewhat of a retarding effect on hardness. Recall that the carbon in Steel D is approximately 1.00 percent. This .70 percent carbon rim, therefore hardens higher. Careful hardness readings across numerous samples of this type of hollow drill steel show a drop of from 5 to 12 points Rockwell C as we go from the extreme surface through this lower carbon rim toward the center.

Study of this phenomenon was also interrupted but some rather interesting results on five different samples had been obtained. Pieces 10 in. long were carefully cut from different bars of Steel D. The length was measured with precision micrometers first and then the surface was removed. With each thousandth removal, the length was measured again. When below the rim and into the lower hardness zone, a definite change in length was noted. More work must be done to evaluate this; however, it does appear that the surface is in compression.

This same thing occurs when the surface is put under compression by shot peening. Dr. J. O. Alman and others have advanced the theory that fatigue failures occur only where tensile stress exists.* Notice the trend toward increase in fatigue life as the amount of surface stressing is increased. Using block and rock testing equipment at the mill, this has been substantiated many times. Unless peening is done on the fabricated rod, however, and again after all reforging operations, the full benefit cannot be realized. After all, most failures occur adjacent to the attachment or shank ends.

* Alman, J. O.—S. A. E. Journal, 1943, 51 (7) 248, 7.

EFFECT OF SHOT PEENING SURFACE LIFE OF HOLLOW DRILL RODS IN MINUTES

FIGURE 9

HOLLOW DRILL ROD SIZE	NO SHOT PEENING	SHOT PEENED *20 SHOT	SHOT PEENED *25 SHOT	SHOT PEENED *28 SHOT
7/8" HEX.	89 MIN. "O"	269 MIN. "I"	160 MIN. "I"	323 MIN. "N.B."
1" HEX.	114 MIN. "O"	561 MIN. "I"	540 MIN. "N.B."	390 MIN. "I"
1 1/4" RND.	336 MIN. "O"	1020 MIN. "N.B."	627 MIN. "N.B."	500 MIN. "N.B."

ORIGIN OF FAILURE

"O"=OUTSIDE SURFACE

"I"=INSIDE SURFACE

"N.B."=NOT BROKEN

COURTESY - GARDNER DENVER CO.

Shot peening increases fatigue life

Avoid Notch Effect

No paper on hollow drill steel would be complete without mentioning notch effect. You all know about the notch effect produced by failures to overlap heats in treating shanks and attachment ends. This abrupt change from heat-treated to natural steel is extremely important. It will exist in the alloy steels just as surely as in the carbon steels and must be prevented. The other notch is the one produced by careless handling, chisel marks, chain marks, corrosion pits, etc. The point to keep in mind is that the harder alloy steels will withstand this nicking and notching a little bet-

ter than the carbon steels but if a notch is present, they will fail more readily. Steel E appears to have excellent possibilities in this respect. It appears to be less notch sensitive at higher hardnesses.

There is a trend toward increasing use of alloy hollow drill steels, and they can do an excellent job of reducing costs by increasing footage drilled. They are not foolproof, however, and will give a good account of themselves only if they are handled properly. Fortunately there is another positive trend—away from hammer and tongs blacksmithing toward careful forging, upsetting and heat-treating.

—Discussion—

Alloy Hollow Drill Rod

By L. F. BOMBARDIERI

Chief Engineer
Iron King Mine
Shattuck Denn Mining Corp.

THE results of test work and actual data taken in test work at the Iron King Mine of the Shattuck Denn Mining Corp. has convinced us of the superiority of Alloy Hollow Drill Steel over the Standard Analysis Straight Carbon Drill Steel.

The tests on the drill steel were run concurrently with certain detachable bit tests and cover a period of five and one-half months, with end results as shown in the test data.

The alloy rods were made from Crucible Steel Co. Park A Alloy Hollow Drill Steel. New steel was used exclusively in the fabricating of both types of rods and the same number

of rods of each type, length and section were entered at the beginning and used throughout the test. In compiling results, a badly bent rod was regarded as a broken or destroyed rod and eliminated.

Every effort was made to make conditions of the test identical as to ground drilled, nature of the operation, air pressure, type of bit and air drill used, human factors, etc.

Based on the results as shown in the test data, Park A Alloy rods drilled 6.75 times as much footage per rod destroyed as did the standard analysis straight carbon rods. In addition to the test, we have found

	Results of Tests Iron King Mine	
	Straight Carbon	Alloy Steel
Total Footage	108,400 ft	117,342 ft
Rods Broken and Eliminated	287 broken 0 bent 287 destroyed	35 broken 11 bent 46 destroyed
Feet Drilled Per Rod Destroyed	378 ft	2,551 ft

an increase to 93 tons per steel failure with alloy steel as compared to the

previous 39 tons with carbon steel. Previously, 300 pieces of steel were reconditioned monthly; now only 185 pieces of alloy steel are reconditioned.

The initial cost of the nickel alloy steel is about 30 percent higher than carbon steel, but with 150 percent better results, an over-all steel cost reduction of approximately 35 percent was obtained. For a period of six months this year the alloy steel cost has been approximately \$0.028 per ton, as compared to \$0.043 per ton for the carbon steel over a similar period in previous years.

eight-ft, one-in. quarter octagon jointed steel were sent to the planning department of Climax for test purposes. The four-ft sections averaged 1200 ft of drilling each and all broke within 100 ft of each other. The eight-ft sections averaged 1500 ft of drilling with the first one breaking at 1150 ft and the last at 1901 ft. This compared very favorably with other steel tests run at Climax.

The average life of all steel used at the Storke Level is approximately 350 ft of drilling before being reconditioned or broken. No steel is discarded until it becomes too short to work into one of our regular changes, and the average over-all cost of drill hole is slightly less than two cents per ft. This includes all steel, material, equipment and labor. These figures cover a period from January 1, 1952, to September 1, 1952, and include approximately 1,250,000 ft of drilling.

Two capable men in the steel shop have been able to supply sufficient drill steel for about 6000 ft of drill hole per day, in a highly siliceous and abrasive granite, that varies in hardness from ground that must be square set while working to the other extreme in which a tungsten carbide bit will not run five feet without being resharpened.

At this time I would like to thank Mr. V. J. Evans for his aid in collecting the data used in preparing this paper.

Alloy Steel on Storke Level

By W. K. McGlothlin

General Superintendent
Gibbons & Reed Co. and Boyles Bros. Drilling Co.

DURING May of 1951 Gibbons & Reed Co. and Boyles Bros. Drilling Co. entered into a contract with Climax Molybdenum Co. of Climax, Colo., to do the preliminary development work on the Storke Level.

At the time the first contract was drawn up a drill shop was set up to handle C. A. Double Diamond Alloy Steel for drilling. The equipment used in this drill shop consists of:

- 1—I.R. 54 Drill Sharpener
- 1—Toledo Rock Drill Rod Machine
- 1—I.R. JF2 Furnace for hardening and annealing Alloy Drill Steel
- 1—I.R. SF27 Steel Furnace for heating steel for forging
- 1—I.R. SDF Electric Draw Furnace for tempering Alloy Steel in a Salt-bath.

The sections of steel used are one-in. quarter octagon and 1½ in. round. The drilling equipment used consists of R-58 Stoppers and DB-35 Drifters on 48-in. shells, with sliding cone and steel centralizers and a New York head. Both types have 30 to 1 rotation. Rounds drilled vary from five to eleven ft in depth. Average depth of long holes drilled with jointed steel is 24 ft and varies from 20 to 30 ft. One-in. quarter octagon steel is used on the longholing with tungsten carbide bits, which vary in size from 1½ to 2½-in. diam.

Our method of treating this steel conforms with that recommended by the manufacturer. We have found this steel fairly easy to work. Our method of annealing consists of loading the furnace to capacity; block off all openings around the front of the furnace; heat to 1450°F, hold at this temperature until all the steel in the furnace has come up to this temperature, then shut off the furnace and leave until next morning. This system is much better than the cycle system and cool-

ing in mica. Steel annealed in this manner is reasonably soft and compares favorably with carbon steel.

We have found that by inducing surface compression on the neck in series type threads, the life of threads on stopper steel is very nearly doubled.

While no specific records or data were kept, three pieces of four-ft, one-in. quarter octagon and four pieces of

Trends in Hollow Drill Steel

By J. FRED JOHNSON

Manager of Operations
Western Mining Department
American Smelting and Refining Co.

THE trend toward use of smaller sizes of drill steel, cited in the excellent paper on "Trends in Hollow Drill Steel," is simply the natural result of the smaller diameter drill holes made possible by drilling with tungsten-carbide and with the one-use or throw-away type of steel bits.

As applied to drill steel, a different effect of using smaller diameter bits was well illustrated in a recent letter from Honduras, where an operator stated he had not tried alloy steel drill rod because a 16-month supply of carbon steel he kept on hand in his isolated location had grown to a four-yr supply on account of his changing from drilling with detachable steel bits to drilling with tungsten-carbide bits. There is a natural reluctance to change the whole drilling machine set-up at any property to the smaller machines dictated by smaller diameter holes. This is a retardant to use of

smaller equipment with a change from carbon steel to alloy steel.

Perhaps the greatest deterrent to adoption of high alloy steel to replace carbon steel is the very critical fabricating, annealing, and tempering procedures necessary to eliminate "notches" and bring the steel back to its as-rolled ideal characteristics. There have been a number of large mine operators, with elaborate shops, who tried to process high alloy steel and finally went back to use of carbon steel. On the other end of the scale small operators, with relatively inferior shop facilities, have fabricated alloy steel so successfully that drilling footages were claimed seven times as great as with carbon steel. The personal equation seems to make the difference.

My practice and my recommendations are that an operator buy completely factory fabricated alloy drill

steel to first determine with accuracy the actual advantages of high alloy drill steel over carbon steel, in reducing drilling cost. Roughly, there are equivalent savings to be made in either the adoption of smaller diameter bits or in the use of alloy steel.

The most complete example I know of in the successful use of alloy steel is in the adaptations of varied special steels, the exact composition of which is the manufacturer's secret, to the problem of perfecting long-hole drilling. This seems worth while citing, as the writer, who has been close to

long-hole drilling technique and hadn't thought too well of it for 30 yr has recently adopted it extensively on account of recent improvements in technique made possible by tungsten-carbide bits and alloy steel.

The millennium will arrive in alloy steel when an alloy is found that will be fatigue resistant and that does not have the critical fabricating, annealing, and tempering requirements of present alloy steel. Perhaps the "E" steel mentioned by Messrs. McCormick and Persons will be the answer.

Cable Repairs

(Continued from page 57)

It was learned early that repaired cables had to be tested to make certain that they contained no concealed defects before returning them to the mine. Use of special equipment discloses any concealed defects or damage that may be present. By concealed damage is meant cases where the conductor insulation has been broken open, but there is no visual evidence of such a condition from the outside of the jacket, and no short circuit has yet occurred. However, if the insulation has been broken open a short circuit will occur sooner or later. While no attempt has been made to keep any record of the frequency of such conditions, a fair estimate would be that in the average run of cable about 10 of these can be found per 1,000 ft. Such conditions are corrected by reinsulating the damaged portions and vulcanizing on a new jacket.

Water Blown Out

One other condition often found in cables coming from wet mines is moisture inside the jacket. Compressed air can be blown through these cables to dry them out. Care must be taken that the air is free from water. In only one case was a piece of cable 200 ft long found which did not permit enough air to pass through to dry it in a reasonable length of time. In this particular case, a small hole was cut in the jacket at about the mid-point and air was blown simultaneously into both ends of the cable, and escaped through the jacket via the small hole cut into it. Moisture in the cable need not cause any damage provided conductor insulation is perfect. However, should a slight hole develop in the insulation, the moisture will come in contact with the conductor thus carrying potential to the moist section of the cable which may be its entire length. A break in the jacket, regardless of how small, will allow this potential to appear on the surface of the cable, especially if it is damp or wet. A condition of

this kind is an invitation to an electric shock which may result in anything from a nuisance to a fatality. It is as important from a safety standpoint to make certain that the wet cable is properly dried and the jacket sealed to prevent the re-entrance of moisture as it is to see that any broken conductors are repaired.

Repairs of this kind will go a long way toward improving the safety of cables as well as reducing costs. Again it should be emphasized that a proper maintenance program must begin at the face of the mine to reduce the necessity of repairs to a minimum.

—BOOK REVIEW—

COAL AND EUROPEAN ECONOMIC EXPANSION, Columbia University Press, 2960 Broadway, New York 27, N. Y. 1952. \$1.75. 68 pp.

A SPECIAL group of experts on coal has examined the coal prospects for the next five years of member nations in the Organization for European Economic Cooperation.

This book is the report of the above group. It analyzes coal needs in various European nations for the next five years in different industries and outlines plans for increasing production from European coal fields. One of the conclusions of the report is that if production of goods and coal production keep pace with the plans envisaged by O.E.E.C. there will still remain a deficit of 25-35 million tons of coal in 1956. This coal would have to come from outside.

Although much of the report is devoted to estimates and may contain certain unpredictable elements which can alter the situation as it appears today, it is the result of much work by people closely associated with coal demands in Europe and should prove valuable to anyone looking to foreign markets for domestic coal production.

Celebrate Silver Anniversary

Now the eighth largest producer of bituminous coal in the nation, Truax-Traer Coal Co., celebrated its 25th birthday with an anniversary dinner at Riverside Lodge, Minot, N. D., on October 5, 1952. Recognized and honored at the affair were 15 men who

were either among the original group of workers or came with Truax-Traer during its first year.

The company has grown from a one mine operation in 1927 to one which produced over 8,500,000 tons of coal and lignite in 1951.



These men have been with Truax-Traer for 25 years. They are, front row, left to right: M. M. Koppelsloen, supt., Custer Mine; J. O. Westlund, director; A. H. Truax, chairman of Board; Lewis Larson, supt., Kincaid Mine; Alfred Kelsven, supt., Dakota Star Mine; J. A. Rist, supt., Velva Mine. Back row, left to right: T. E. Graham, Kincaid Mine; L. T. Erickson, asst supt., Dakota Star Mine; R. A. Russell, asst to vice-president, Minot; A. M. Sandberg, asst supt., Velva Mine; R. L. Swartzel, shovel operator, Custer Mine; A. J. Abbott, shovel operator, Custer Mine; N. L. Posey, shovel operator, Custer Mine.



Report of subcommittee on roof bolting had attentive listeners

Coal Division Committees Report

ON Thursday, November 20, more than 250 members of the American Mining Congress Coal Division met at the William Penn Hotel in Pittsburgh. Primary purpose of the meeting was to hear reports covering progress made by the various Coal Division Committees during the past year. Those present were representatives of operating companies and manufacturers from every part of the country.

At these annual conferences progress toward the solution of current mining and preparation problems is described by spokesmen for each committee. In addition much valuable information and many ideas for further study are brought out in the discussion of each of the reports. Those who attend derive great benefit from the experiences of the recognized authorities in their fields, who make up the committee membership.

A pleasant interlude in the day's proceedings was provided at the luncheon held in the Ballroom of the hotel. Dr. L. E. Young of Pittsburgh, presided as toastmaster, substituting very ably for L. C. Campbell, Chairman of the Coal Division, who was unable to be present. Dr. Young welcomed the coal men and manufacturers to the conference and introduced the distinguished guests at the head table. Among these were several members of the Advisory Council: E. R. McMillan, vice-president, Northwestern Improvement Co.; I. N. Bayless, president, Union Pacific Coal Co.; and T. F. McCarthy, vice-president, Clearfield Bitu-

Latest Developments in Equipment and Operating Practice Described at Annual Conference in Pittsburgh

minous Coal Corp.; Charles B. Stainback, chairman, Manufacturers Division; and the two speakers, H. F. Hebley, research consultant, Pittsburgh Consolidation Coal Co., and G. F. Prideaux of the Illuminating Engineering Society.

Henry Hebley gave a short, extremely interesting report on the work being done toward the abatement of stream pollution in the Ohio River Basin. He pointed out the position of coal mining in the over-all picture and urged that the industry take precautionary measures lest overly stringent laws be enacted—laws that might make it impossible to mine and prepare coal economically for the market. He emphasized that while the problem affects all operators—large and small—it is particularly troublesome for those whose production is counted in thousands of tons per day. Modern clarification processes, he said, can reduce the amount of suspended solids per ton of coal cleaned to an almost insignificant count.

Mr. Prideaux, as an emissary of the Illuminating Engineering Society, made a plea for better lighting in mines. He graphically illustrated that better visibility is the result of contrast and reflectance between background and object, and pointed out that the power cost of achieving equal visibility can be reduced up to 20

times by increasing contrast and reflectance.

"How to accomplish this," he said, "will be another of your many problems."

As a partial solution, he advocated that machines be painted with light colors, washed frequently and that control knobs be polished. He also urged the use of white safety hats, liberal use of reflectors, use of only the best cap lamps, higher voltage on machine lights for normal output, and continuance of the battle against coal dust.

He concluded his talk by illustrating, on the spot, how rock dusting can increase both contrast and reflectance.

With the conclusion of Mr. Prideaux' talk, the luncheon meeting was adjourned to the Urban room for the afternoon session.

Future issues of MINING CONGRESS JOURNAL will carry full committee reports when the studies concerned are complete and the suggestions offered at the Conference have been acted upon. The abstracts which follow were condensed from the reports as they were given in preliminary form at the Conference. They recount progress to date on each study, and are subject to changes resulting from the exchange of ideas and critical appraisal of men from all parts of the industry.

ROOF ACTION

Committee Chairman
FRANK G. SMITH

METHODS OF ROOF SUPPORT

E. H. JENKS

THIS report is to deal with all types, methods and materials of temporary and permanent roof supports, covering the complete range from the simplest form of wood post through to the more complicated designs of steel beams and arches including jacks, cribs, rib pinning and roof bolting. The study will attempt to show under what roof conditions and for what services each type of support is best suited and is the most economical. The time element will be taken as the primary factor; in other words, the basic question is, "What length of time does a roof in a particular place have to be supported—in continuous and conventional mining?" Is the top to be held for a day, a month or a period of months or years?

The subcommittee has divided the study into three parts as follows: (1) Entry development for (a) long life and (b) short life; (2) room mining where (a) pillar recovery is contemplated and (b) where recovery is not contemplated; and (3) pillar extraction in (a) room and pillar mining and (b) long-face mining. While these groups are now working independently, their studies will eventually result in a consolidated report. The first step is to correlate the various factors that determine the roof action—physical characteristics of the seam and overlying strata—with the idea of selecting the most economical type of roof support for various typical conditions, and mining methods. Outlines for the studies were submitted by W. D. Hawley and A. J. Barry and a report is expected in the near future.

ROOF BOLT TESTING

J. S. WHITTAKER

THIS study has been under way for the past year and a preliminary report was submitted by L. A. Panek, W. J. Lewis, and J. H. Scott. These described tests made to determine the two most important characteristics of an installed roof bolt, other than the strength of the bolt itself, namely the bolt tension and the load bearing capacity of the bolt anchorage.

Tension in an installed bolt may be determined by measuring the torque required to tighten the bolt, or by pulling the bolt and noting the load at which the roof plate loosens. For a given bolt diameter, if the relation between torque and tension is known, the tension in a bolt can be predicted by measuring the torque required to tighten the bolt. This is the basis for the use of a torque wrench to determine tightness of roof bolts. However, this method is applicable only if all of the conditions which affect the friction are satisfied. A bolt selected for torque measurement should be straight; the head or nut should bear evenly on the roof plate; the threads should be clean and free of rust; the bolt should not have "run out of thread" owing to improper installation.

If these conditions are not satisfied, the torque-tension figures must be regarded as very rough approximations. Any factor that increases friction, such as a nut that gouges the roof plate, or the presence of considerable rust on the threads, may require a much higher torque reading to achieve a given bolt tension. Excessive lubrication will decrease the torque required to obtain a given bolt tension. It should be remembered that the objective is not to create torque but to create bolt tension.

The report then described in detail the procedure for

determining torque-tension relationship and determining tension by plate-tapping test applied to both the wedge and shell type bolts.

The anchorage test consists of pulling an anchored bolt until its measured displacement becomes excessive. For the wedge type bolt, required equipment consists of a hydraulic jack with attached load-indicating gauge, a bolt extension with an adapter to connect to the end of the roof bolt, and a device for measuring displacement of the end of the bolt. Test procedure is as follows: The bolt is installed according to normal practice, except that it is not tightened. The pulling equipment is attached and the displacement measuring device placed in position. Load is gradually applied to the roof bolt, and the displacement is measured for each load increment, say 2000 lb. The load is increased until either the anchor slips, the bolt yields, or the bolt breaks, as desired.

To determine the anchorage capacity of an expansion shell and plug, required equipment consists of a hydraulic jack with attached load-indicating gauge, a high strength test bolt with an extension and adapter to connect to the end of the bolt and a displacement measuring device (same device as for wedge type bolt).

Test procedure is as follows: The roof bolt is installed and tightened according to normal practice, and the torque measured with a torque wrench. The bolt is removed, leaving the shell and plug in place. The test bolt is inserted in the plug and the pulling equipment attached. With the displacement measuring device in position, load is gradually applied and the displacement measured for each load increment. Loading is continued until displacement occurs without corresponding load increase, which indicates that the anchorage capacity of the shell and plug has been reached.

This test measures the holding power, or anchorage capacity, of the expansion shell and plug installed at a predetermined torque in a given type of roof rock. Use of the high strength test bolt makes it possible to measure anchorage capacities in excess of the ultimate strength of the regular mine roof bolt (up to the yield load of the high strength bolt). The test can, of course, be performed with the regular roof bolt, but in this case the anchorage strength cannot be determined if it exceeds the yield load of the bolt, which is about 12,000 lb, minimum, for a ¾-in. mild steel bolt.

CONVEYOR MINING

Committee Chairman
A. E. LONG

METHODS OF BELT LOADING

J. W. HARDY

THE life of expensive, vulnerable, rubber conveyor belt depends to a great extent on the manner in which the conveyor is loaded. Discharging of shuttle cars directly onto a conveyor constitutes one of the greater hazards to belt life. Surge loads are high, causing load turbulence, belt scuffing, impact damage and spillage. A loading station device that will minimize these hazards, yet not bottleneck tonnage, should be used. When it is considered that the belt normally constitutes 50 percent of the complete conveyor cost, thought and expense put on loading stations is well spent.

The principal devices to load from shuttle cars are as follows:

(1) *Flare plates* or skirt boards are most common and economical, but have few of the attributes of a good loading station. Hinged flare plates are of two types, one is manual in which the plates are lifted back off the belt

when the station is not in use to prevent inby coal passing through the station without turbulence. The other is automatic with a flare on the inby end of the counterbalanced skirt board. (See illustration below.)

(2) A *slow speed chain conveyor* which receives surge load of the shuttle car and places it on the belt at belt capacity. (See illustration.)

(3) A *high speed chain conveyor* is normally used for loading over the tail pulley where coal can be placed on the belt at approximately belt speed and in the direction of travel with minimum scuffing or turbulence.

(4) A *shaker hopper* is for use with a shaker conveyor which discharges onto the gathering belt.

Belt transfer points are described by J. R. Fletcher and cover (1) In-line transfer from one belt to another; (2) Right angle transfer from a panel belt to main line conveyor; (3) Transfer from main line to slope conveyor.

In-line transfer requires no more than flare boards when the size consist of load is small and the two belts are traveling at nearly the same speed. If large lumps are a part of the load, a chute is necessary to reduce impact. When a bar screen chute is used the small coal falls through and cushions the lower belt against falling lumps.

Right angle transfer can be accomplished by a curved chute to place the coal on the main line conveyor in the direction of belt travel. If the main line belt receives material from several loading points, the bottom of the chute is hinged and counterbalanced so that coal on the mainline belt lifts the chute to pass beneath.

Transfer from main line to slope is more elaborate than at any other point. Quite often this involves a storage problem consisting of a bin and plate feeder. Shuttle conveyors may be used to feed the bin. This is a good point at which to employ an electro-magnet for removing scrap iron.

HANDLING SUPPLIES AND MEN IN BELT CONVEYOR MINES

R. W. STOREY

THREE common methods of transporting men and supplies in belt conveyor mines are: (a) reversing belts, (b) rubber tired haulage and (c) rail haulage paralleling the belt line. Each is considered separately below, listing its advantages and disadvantages.

(a) *Belt reversing* eliminates need for a supply road or entry, except for getting equipment in and out. There is a minimum of capital invested per ton of mining capacity since no special transportation equipment need be purchased for hauling men and supplies. Reversing, however, usually results in damage to the belt because it is

almost impossible to train a mine type belt to run true in both directions. Special provisions for loading or unloading men such as slow speed of the belts, sufficient height at loading and unloading stations, etc., required in the interest of safety, might prove costly under some conditions. Supply haulage becomes somewhat complicated and costly if it is necessary to transfer the supplies once, or more, before reaching the working face. It might prove difficult, in three-shift operation, to find a time when the belts could be reversed for handling supplies. Heavy mining equipment cannot be taken in or out on a belt conveyor. In a highly mechanized mine this could be a problem of major importance.

(b) With *rubber tired haulage*, practically all territory in a section or mine is, or can be made, accessible. This is a highly mobile and very flexible system. There is no serious interference with traffic or production in getting men, supplies, equipment or supervisors in and out. The disadvantage lies in the original cost of the rubber tired equipment and maintenance costs. Equipment is relatively slow, which makes it unsuitable for long distances. Most present units will haul only small loads (as compared to track mounted equipment) and for that reason most heavy mining machinery must be trammed in and out. Roadway maintenance is often expensive, particularly in wet places.

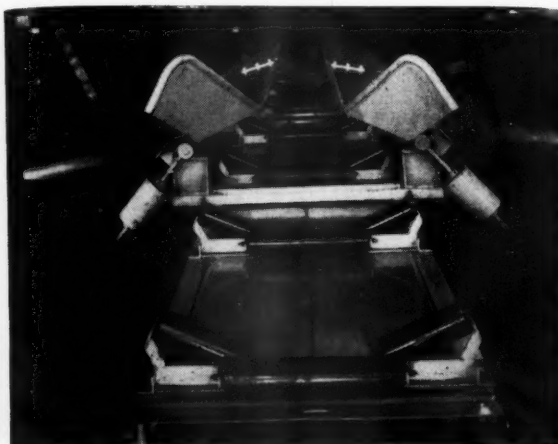
(c) *Rail haulage* paralleling a belt line provides relatively fast transportation; also large loads can be hauled. These first two advantages might allow fewer men to handle the job of supplying a mine than would be possible by reversing belts or with rubber tired haulage. Getting heavy mining equipment in and out of a mine is relatively fast if conditions (height, etc.) allow it to be hauled on track equipment. However, this method would require the purchasing and installing of track and suitable haulage units. Since track could not be laid all the way to the face in a conveyor mine, some other means of transportation would be needed for the last few hundred feet. Sometimes, in very low coal, it would be necessary to brush the entry in which the track is installed.

The report concluded with accounts submitted by H. A. Jones describing actual operating experience with Man Trips and Supply Handling with Rail Haulage and Supply Handling with Rubber Tired Haulage—Man Trips on Belt.

BELT FIRE PREVENTION

S. T. ALLSBROOK

BELT conveyors have three inflammable components: (1) belting, (2) lubricants, and (3) power cables. In addition, coal dust and timber accumulations in the belt entry can



Belt loading device. (Left) chain conveyor: (right) movable flare boards

make a further fire hazard. The following measures for preventing fires to belt conveyors should be given careful consideration:

- (1) Analysis of all possible causes.
- (2) Eliminate the causes or at least reduce them.
- (3) Install protective devices wherever practical.
- (4) Formulate and enforce easily understood practical rules, for operating, maintaining and transporting belt conveyors.

The following list gives the main causes of conveyor belt fires:

- (1) Friction
 - a. At the drive
 - b. At the idlers
 1. Poor alignment
 2. Heating of drive due to stalled belt
 3. Obstruction in belt
 4. Torn belt wrapped around idlers
- (2) Mechanical and electrical defects
 - a. Faulty starters
 - b. Poorly installed electrical service
 - c. Short circuit of parallel power wires

Operating standards will vary from mine to mine but the following suggestions for fire prevention will apply everywhere.

- (1) *Cleanliness (good housekeeping)*—All belt entries should be kept clean of loose material. Coal dust, oil, grease, etc. should be removed when necessary from the belt head, tail piece, and loading points. Breakthroughs should be free of obstructions, especially at points where stoppings are provided with doors. Dust, coal, slate, replaced rollers, tools, or other material, should be removed from belt framework and the floor below.
- (2) *Drainage*—Belt entries should be kept free from standing water and mud. Dripping water on conveyors and belts should be eliminated.
- (3) *Dust Control*—Careful checks should be made to see that there is rock dust at critical points for use in an emergency. Coal dust in the air should be held to a minimum by controls at all coal transfer points if necessary.
- (4) *Electrical controls* to help eliminate fires—
 1. A device to prevent motor overload.
 2. Sequence control of belts in series.
 3. Automatic stop in case of belt slippage or break.
 4. Automatic stop and start controls at feeder belt discharge to prevent coal pile up.

Emergency switches or other suitable controls should be located at loading and unloading stations and at intervals with lights marking their location. Some mines use a continuous wire control system along the belt line so that a man can stop the system at any point along the line by pressing the wires together.

HAULAGE ROADS

Committee Chairman

A. E. BELTON

STANDARDS FOR HEAVY RAIL TURNOUTS

J. E. ELKIN

THIS subcommittee which began its study over a year ago has made considerable progress in the designs for heavy rail turnout—70 to 100 lb rail. Drawings and specifications for cast steel frogs and for bolted frogs were submitted by E. E. Roecker and J. B. Haskell, respectively. These show the design with the assembly of all of the frog parts. Drawings for switch points and other parts for the complete turnout are in preparation

by C. F. Meyer. The finished report is to be submitted to other manufacturers of rail and track material and, after their approval, the drawings and specifications are to be included in the next edition of "Construction and Maintenance of Main Haulage Roads in Coal Mines."

AUTOMATIC EMERGENCY BRAKING ON A LOCOMOTIVE

A. R. ANDERSON

IT is possible to provide automatic emergency braking on a locomotive if it has power brakes, the haulage system utilizes block signals and there is a de-energized section of trolley wire at either end of the occupied block. Air brakes are preferred for this purpose.

To show how the system works, suppose a locomotive ran through a red block signal and onto the de-energized section of trolley wire. The contactor in the locomotive control circuit could be arranged to then drop open, de-energizing the locomotive control circuit. This, in turn, would de-energize the solenoid operated air valves and automatically close the air line from the engineer's valve to the brake cylinder, opening the air line from the auxiliary reservoir to the brake cylinder and setting the brakes. Not only is power removed from the locomotive motors, but the circuit stays open until the trolley again is energized and the controller is in the "off" position. When the de-energized section of trolley wire is re-energized, or when the locomotive comes to rest on an energized section of trolley wire after passing the de-energized section, normal control for the locomotive is reestablished by turning the controller to the "off" position.

This sort of automatic emergency braking will also function whenever the trolley shoe leaves the trolley wire or the power goes off. There should be no objection to this, as power should be shut off and the locomotive brought to a stop when the trolley jumps the trolley wire. The trip should likewise be brought to a stop when power goes off.

WARNING TO PREVENT BLOCK SIGNAL VIOLATIONS

EVERETT C. BROWN

PURPOSE of the proposed warning signals is to stop block signal violations and prevent collisions by warning the offending motorman, the motorman legitimately in the block, and possibly the dispatcher, when a violation occurs. The warning is a flashing red light and a horn sufficiently loud to be heard above the noise of trains. Since the lights and horns are connected in multiple to a common line wire, the quantity used and their location can be determined by the number of entrance points and the length of the block.

After the warning signals have been started they can only be stopped by backing through the same contactor that started them. In case of a power failure, the relay armature positions are retained so that the signal indications are not affected when power is restored. This applies to both warning and block signals.

In general, motormen pass red signals because they are thinking about something else; day dreaming; worried about finances or sickness in the family; fatigued or drowsy. Automobile drivers sometimes run by red traffic signals for similar reasons. The flashing lights and horns are intended to "wake up" the signal violator and warn the locomotive in the block.

A locomotive entering a block first passes the setting contactor which is located at a braking distance before the signal, changing it to green and the signal at the far end to red. After passing the green signal, the locomotive engages a second trolley contactor which changes the signal to red behind the locomotive to stop a following

motor. If a locomotive disregards the red signal at either end and attempts to enter the occupied block, the warning signal will be started when the motor engages the contactor beyond the signal. The warning will be stopped only if the violating locomotive backs through the same contactor. When the locomotive legitimately in the block reaches the far end, it restores both signals on passing the trolley contactor located beyond the signal.

The combined block signal and warning signal control at each entrance point in a block consists of two latch relays and a special three-coil latch relay with the necessary resistors, fuses, and switches, assembled in one case. A warning signal control in a separate case can be added to certain types of two-light or three-light automatic block signals already installed.

DETERMINATION OF MINE CAR CAPACITIES

REPORT A—13-TON CARS

EMMETT T. LANG

FACTORS influencing the selection of car size to be used in a mine are the same in a new or an old mine, with one exception. In an old mine with several miles of existing haulage, the maximum size of car to be used is determined by clearance in the entries. A new mine in the same area might be able to use a larger car by driving wider haulage entries.

Recently a mine decided to replace the present 2½-ton capacity, four-wheel wooden cars with new eight-wheel, steel cars of 13-ton capacity. The seam height averages 60 to 64 in. with an additional 6 to 10 in. of slate mined with the coal. Present active working sections of the mine are from five to seven miles from the bottom dump. The haulage has five 13 to 15-ton locomotives on the main line and five 10-ton locomotives used as gathering motors. Each motor crew consists of a motorman and a brakeman, as the present wooden cars have hand couplers.

Wooden cars now in use have a capacity of 66 cu ft and cost \$450 or \$6.82 per cu ft capacity. The new steel cars have a capacity of 310 cu ft and cost \$1300 or \$4.19 per cu ft capacity. It will require 4.7 small wooden cars to equal the capacity of one large steel car. Dead load weight of the 4.7 small cars is 16,450 lb while the dead load weight of the steel car is 9000 lb. A power savings of more than 45 percent will be made on each trip due to the difference in weight. The new cars will also have roller bearings, which will increase the savings.

At the present time the company has 650 2½-ton wooden cars in use with a storage capacity of 1625 tons. The 175 13-ton steel cars on order will have a storage capacity of 2275 tons.

The company will purchase two 25-ton locomotives. One will be used on the main line haul and the other kept as a standby motor. One motor, operated by one man, will replace the five motors and ten men now used each shift on main line haulage. The new motor will make a round trip of 9.2 miles every 60 minutes, maintaining a loaded speed of 12 mph. This change in the main line haulage will save 18 man-shifts per day and may eliminate one gathering crew, which would save four more man-shifts.

MINE B—25-TON CARS

DAVID A. ZEGER

A new mine producing 4000 raw tons in a three-shift operation was planned to mine 5000 acres of 45-in. coal for a period of 35 years. The first 10 years would be mainly contour mining by a system of belts hauling the coal to the outside and automatically loading it into mine cars. Since the size of mine car used would have to be suitable to the track installation, plans call for 30 25-ton drop bottom mine cars on 80-lb track. Thirty-in. belts were to be used for gathering haulage, regardless of the main line haulage used.

Cars are 30 ft long, eight ft wide, and six ft, 2 in.

high above the top of rail. They have overlapping ends to afford continuous loading without stopping the belt. The haulage crew consists of only one motorman each shift. He spots the empties on six different loading tracks, picks up the loads, and dumps the loads at the head house without any assistance.

During the preliminary study the question arose as to the future main line underground haulage system for this mine—large cars, low-vein cars, or belts. The first study showed that track was more suitable than belt at this particular mine for main line haulage. Then, a second study was made to determine the proper size car. A 25-ton car has more advantages (economical and otherwise) than a low vein car.

Due to the undulations in the coal seam, some grading will have to be done, regardless of the car size. By doing a larger amount of brushing, lower grades will be obtained. These will result in a lower power cost, faster haulage, and a simpler haulway drainage system. Approximately half of the cost of rock excavation for 25-ton cars will be offset by a reduction in ventilation power cost.

If the haulway is graded high enough for a car that is six ft, two in. above top of rail, not only will there be a savings in ventilation cost, but also the track and trolley system will be more economical to install and maintain. A high entry will also allow closer supervision, faster mantrips, and a lower over-all haulage cost per ton-mile.

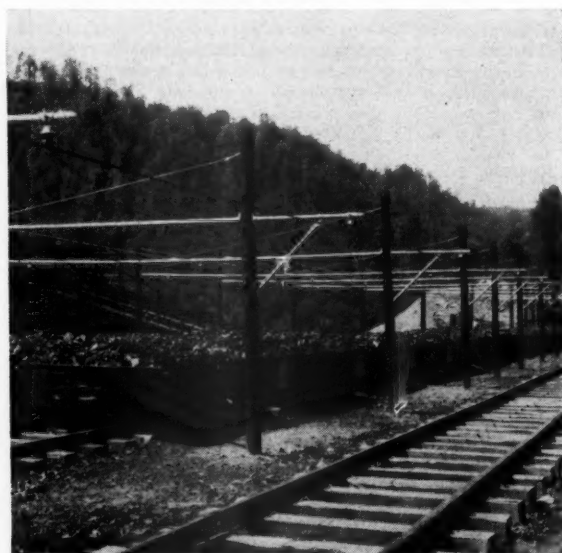
MINE C—MINE CAR FOR 28-IN. COAL

R. D. FLOWERS

THIS report deals with a drift mine where the coal is hauled approximately 3½ miles from the working section farthest inside. The seam is from 28 to 45 in. thick. About half the working sections are in 28-in. coal where no top or bottom is taken; therefore, the equipment is made to suit the low height.

The haulage system consists of rubber tired shuttle cars which deliver coal to a main track and load into mine cars that travel to the dump at the preparation plant. The main line track is 60-lb rail on 5 by 7 in. creosoted wood cross ties. The main entries were originally driven narrower than present standard practice and there is approximately two miles of main haulway where seven ft is the maximum width car that can be used and still maintain safe clearances along the rib line.

In 1951 management decided to improve the haulage



Increased car capacity is reducing haulage costs

by installing a modern efficient haulage system. It was desired to eliminate every possible man-hour of labor in moving the coal from the working section to the tippie. An eight-wheel solid body car was selected instead of the former four-wheel end dump car because of several factors. The live load ratio of the larger car is 1.0 to 2.0 where the smaller car was 1 to 1.35. This factor influences the number of locomotives required to haul the total tonnage of coal so that less manpower and motive power is required. The larger car travels faster due to its better stability, easier tracking qualities and less spillage. Track cleaning is practically eliminated. The factors which determined the size of car for this mine were clearance limitations. It was decided to obtain the largest car that would operate in established haulways.

VENTILATION

Committee Chairman
STEPHEN KRICKOVIC

SOURCES AND PREVENTION OF AIRBORNE DUST

W. D. NORTHOVER

BASED on accounts received from several companies operating in various states, the principal sources of airborne dust are the face operations and haulage by rail and belt. Coal in pillar sections and even the virgin areas in some mines is dry and much dust is produced unless it is controlled. Dust is put into suspension by drilling, cutting, and blasting at the face. Hand loading into mine cars is another source, whereas mechanical loading does not appear to generate so much. Dust made in drilling holes for roof bolting also creates a serious condition unless it is controlled.

In most of the mines at one company, the problem of dust allaying is attacked at the face where water is generally sprayed during dust-producing operations. If spraying at the face does not provide enough moisture to eliminate dust in other dust-producing operations during the transfer of coal from the face, then water sprays are used in such places where necessary at transfer points, loading points, etc. Water and sometimes calcium chloride are used on shuttle car haulageways where necessary. To facilitate coal screening, the use of water is kept to a minimum consistent with dust-free operation.

To provide water for spraying at loading points one mine uses two-in. pipe. From there one-in. and ½-in. pipe carry it to the working faces where hose is used. Pressure pumps supply water to the working faces at 40 to 60 psi.

Haulage dust is very often of a larger size than dust at the face. It is created by fast-moving trips traveling against a high-velocity air current. Some is also made by the car wheels grinding small particles of spillage coal on the rails, but this can be controlled fairly satisfactorily by keeping mine cars in good condition. Haulage dust is pretty well eliminated by sprays located at the outby end of haulage partings where trips are wet down before they start on their way to the surface. In some mines there are several wetting stations.

All cutting machines use water while cutting to allay the dust at the face. In severe cases, such as continuous miner operations, compound M is used in the water to spray the coal face while cutting. In the case of continuous miners, several sprays are installed behind the canvas on the return side to cut to a minimum the dust that gets past the machine sprays.

All fresh falls of coal are sprayed before loading begins.

In shaking conveyor loading, a small flow of water is run down by the pan line to keep everything wet while loading.

On all main partings an overhead spray wets the loaded cars before they are pulled along motor hauls or slope hauls.

Along haulage roads, frequent cleaning and rock dusting is done to prevent formation of dust. This also applies to any location where coal spillage is being run over and crushed to form coal dust.

SEALING OR VENTILATING MINED AREAS

W. D. MEAKIN

MINE sealing is a controversial subject and in submitting the following reports, the authors wish to state that no standard can be promulgated to apply to all operations. Thickness and character of the coal, depth of cover, roof and floor strata, whether the mine is gaseous or non-gaseous, all have an important bearing. In addition, the size of the coal field involved and the extent of the abandoned areas must also be considered.

It had previously been decided by the committee that the first step would be to gather descriptions of typical practices from mining companies in various fields. Accordingly, accounts were submitted by W. D. Meakin, W. D. Northover and A. E. Condon covering sealing and ventilating procedures in several states. Supplementing these accounts, a list of "pros and cons" for sealing and ventilating was submitted by Ray Mancha and A. J. Oppermann. These are summarized as follows:

Advantages of Sealing

The tendency towards low oxygen content behind seals reduces the likelihood of fires or explosions resulting from spontaneous combustion.

Properly ventilated seals reduce the likelihood of gas surges upon intakes.

Possible power savings reduce the cost of mine ventilation by avoiding the necessity of taking air through worked out areas with inadequate air courses.

Regular examination of abandoned areas is avoided. Such inspections are extremely hazardous and these hazards consistently get worse and not better. Also the number and size of abandoned areas increases.

There is no danger of unauthorized employees entering hazardous abandoned workings.

Air used to ventilate abandoned areas could propagate a mine fire started in the gob area.

In case a mine fire starts in the vicinity of a sealed area it could be controlled quicker and easier on account of the smaller extent of the open workings.

If a sealed area is flanked by a return air course any leakage through the seals would be taken directly to the fan.

Large mines can be planned so that extensive areas can be sealed off with a minimum of seals, reducing to a minimum the number of places to be inspected.

Disadvantages of Sealing

A gas concentration might prove a hazard if the seal became damaged or destroyed or if there should be leakage through strata cracks in the coal or roof. Such hazards may occur during a fall in barometric pressure.

There is an unknown factor as to whether roof or bottom pressure in the course of time will crush the coal enough to loosen the seals and permit outbursts of pent up pressures behind the seals.

An explosion hazard exists in the event that a fire on a haulageway might creep over or around the seal and come in contact with high gas concentrations.

A constant uncertainty of exact conditions behind the seals, even with daily inspection, pressure relief valves and continual maintenance.

Pillars of coal must be left to protect a seal. This reduces the percentage of coal recovery.

The economy of sealing may be questioned in relation to the results achieved especially where it is less expensive to ventilate an abandoned area by return air.

MECHANICAL LOADING

Committee Chairman
J. J. SNURE

SHUTTLE CAR ROADWAYS

W. E. HESS

THE major portion of all coal mined by off-track mechanical loading is transported from the face to the mine car or conveyor loading point by shuttle cars. Size of the shuttle and the load it carries varies with the height of the seam, and in turn the size of the shuttle and the load it carries affect the wear and tear on the roadways over which the shuttle cars must operate. Realizing that roadways can vary materially, affect coal production, a subcommittee is making a study based on information available from various companies.

Factors affecting shuttle car haulage, as reported by these companies, are summarized below.

All mines contacted reported little difficulty when shuttle car roadways are dry. Water, even in small quantities, is a constant source of trouble and must be given immediate attention. Some companies have successfully used rock dust and fine coal in wet holes on the haulway. Most operations, however, report that where any appreciable amount of water is encountered, they are corduroying the roadbeds with plank or old ties.

Heavy loads require the large shuttle cars which are equipped with large tires. Large tires have less tendency to cut and rut the bottom, but because of the heavy load, do have a definite detrimental effect.

Some mines attempt to leave a hard coal bottom for the roadway, which, of course, provides a smooth haulway with no rutting. The coal, however, has a tendency to break up. The majority of mines (82 percent) have either a shale or fireclay bottom which will often rut even when dry. To overcome this difficulty and provide as smooth a roadway as possible 55 percent of the mines reporting use a drag, usually made of 40-lb rail, the width of the car, installed under the middle of each car.

Cleanliness of roadways next to proper tire inflation is the biggest factor contributing to shuttle car tire wear. Hauling over spillage, especially when the coal is hard, tends to cut tire side walls and causes premature failure. It should also be borne in mind that a dust hazard is created when coal is allowed to remain on the roadway.

Seldom are grades too steep to haul over encountered. The seriousness of grades and their effect on haulage is appreciably increased where the haulways are wet, however. In such instances it has been necessary to use chains on all four wheels.

The longer the life anticipated for the roadway, the more important becomes the care and attention it must be given. For this reason projections should plan a system that will shorten the haulway life as much as possible.

SERVICE HAULAGE FOR CONTINUOUS MINING

FRANK R. ZACHAR

THIS study will be limited to service haulage methods for taking coal away from a continuous mining machine and will not consider main line transportation. Following is a preliminary outline of the problems to be solved and some factors which must be considered in each.

The service haulage system must permit the operation of the continuous mining machine with a minimum of haulage delays. It must have sufficient capacity to handle the peak capacities of the continuous mining machine being

used. And it must be adapted to suit the coal measure being worked. Seam conditions to be considered are; (a) thickness, (b) gradient (uniform or varying), (c) bottom condition, (d) roof support requirements, and (e) moisture. It must be able to handle the size consist of the coal produced by the continuous mining machine. It must permit ventilation requirements such as check curtains and line brattice to be installed as needed. It must be able to handle foreign material such as heaving bottom, roof falls not loaded by the continuous mining machine, clay veins, rolls, and rock intrusions. Adaptability of the service haulage system to past, present, and future mining projections must be considered.

Three methods of handling coal from the continuous mining machine now widely used are:

- (1) From machine directly to service haulage unit.
- (2) From machine to crawler loader to service haulage unit.
- (3) From machine to surge car to service haulage unit.

Four types of service haulage equipment will be studied; (a) shuttle cars, (b) articulated conveyors, (c) sectional conveyors, (d) extensible conveyors, and (e) bridge conveyors.

ROOF SUPPORT FOR CONTINUOUS MINING

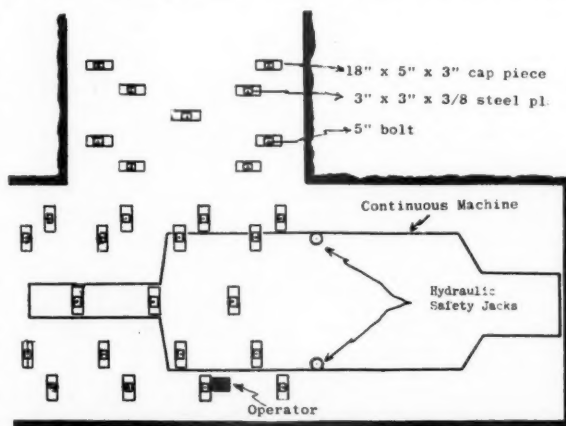
J. A. YOUNKINS

IN the short time elapsing since formation of this subcommittee, there has been no opportunity to hold a meeting. However, some correspondence has developed a few comments on the roof support problem. These are as follows:

It may be possible to incorporate in the continuous mining machine roof bolting units which would be capable of drilling two or possibly three holes simultaneously. In low coal drilling the center hole presents a difficult problem as present machines require all the available height clearance. Consideration, therefore, may be given to mounting the roof bolting equipment somewhere on the surge equipment to drill for, and install the center bolt. It is realized that this would leave the center unsupported over the longest period of time as it could not be bolted until the machine had advanced far enough to clear the surge equipment.

If we assume a loading rate of approximately one tpm, and 16-ft wide places, it would be necessary to drill each set of holes and install each set of bolts in at least 3½ minutes to avoid holding up production of the machine. It must also be kept in mind that the drilling of holes simultaneously with the operation of the miner would have to be accomplished without any further obstruction of the operator's visibility.

Where bolting would not be the answer to roof control,



Submitted by J. A. Younkina
Plan of roof bolting for continuous mining

we must improve the method of setting conventional timber. The hydraulic jacks now on the machine have been used to good advantage for this purpose but they are in a position on the machine where it is difficult to get the timber to the jacks in low coal. It may be possible to install rollers on the side of the discharge boom and the timber could be rolled up over the machine to the roof jacks. It might also be possible to install a power saw on the continuous miner which would speed up the job of setting timber.

UNDERGROUND POWER

Committee Chairman
C. C. BALLARD

HIGH VOLTAGE CABLES

C. C. CONWAY

Preliminary Report by T. R. WEICHEL and E. W. DAVIS

THIS project deals with high-voltage power cables for transmission of three phase, high-voltage alternating current in shafts, boreholes, drifts, and entries in underground mines. The individual conductors of these cables are shielded, with grounding conductors located in the interstices in contact with the shielding. A nonmetallic rubber-like polychloroprene sheath serves as the armor protection over the cable assembly. Purpose of the study is to formulate manufacturing specifications and recommendations for installation of such cables in underground mines. This phase of the project does not include cables having steel wire or steel type armor.

Metallic-armored cables have been used in mines for many years and have given excellent service. Such cables were intended as permanent installations and generally remained stationary during the complete life of a mine. Modern, high-speed mining systems require power cables to be moved from time to time as mining operations are completed and new areas or mines developed. Frequently this moving cycle occurs one or more times per year. The use of metallic-armored cables for such applications is not always considered economically practical.

Many mines have installed cables of the type described herein and excellent results have been obtained. This cable can be moved from one installation to another without danger of internal damage and is suitable for installation in air, burial in the mine floor, roof or rib or submersion in mine waters. It also has excellent abrasion-resistant qualities.

Recommendations for installation of this type of cable are not contained in the report and will not be presented until the committee has sufficient information to formulate safe recommendations. In order to assist the committee in formulating their recommendations, applicable recommendations are quoted from some State Mining Laws, the Federal Mine Safety Code and American Standards Safety Rules for Installing and Using Electrical Equipment in Coal Mines.

REVERSED POLARITY FOR MINING OPERATIONS

A. L. JOHNSTON

A number of mines are operating with so-called reversed polarity. This means that the trolley wire is connected to the negative source of power, and the positive side is connected to the rail, which is of course grounded. Apparently the greatest source of trouble with this type of installation comes from moisture in the mine roof. This was brought out in a NACE Sub-Committee Report which reads as follows:

"There has been some experience with trolley insulator

failures which has been attributed to positive grounding. Under certain soil conditions there appears to be a tendency for soluble ions to migrate across the damp insulator surfaces toward the negative conductor. This increases conductor leakage with attendant heating which softens the conductor supporting pin compound, permitting the trolley wire to fall. No similar experience has been noted with negative grounding."

Upon further investigation, it was found that this subject had been gone into very thoroughly on account of electrolysis, which also occurred when operating with negative trolley system. Due consideration of the subject was given at a recent meeting of the Power Committee of the AMC when it was found that the problems were similar to those encountered in many mining operations. The AMC Power Committee endorses the report of the Sub-Committee and recommends its adoption by the mining industry, but cautions against changing over existing installations of grounded positive to grounded negative, without consulting the manufacturers of the original equipment.

STANDARDIZATION OF MINING MACHINE MOTOR IDENTIFICATION

F. R. HUGUS

IT appears that the mining industry is now at a point in its development when it will be worthwhile to review certain motor identification practices to determine if improvements will accrue from the use of uniform standards.

The nameplate of mining machine motors can be made very useful if the markings on these plates refer to a common basis. Some machines have plates that present only the manufacturer's name and a number which identifies the motor. Most manufacturers present quite a bit more information, but the horsepower figure may be based on continuous duty, one hour, $\frac{1}{2}$ hour, or some other length of time and on a 40°C, 75°C, or 115°C temperature rise. The ambient temperature on which the temperature rise is based is usually 40°C, but it may be some other value. Since the ambient temperature in a mine is about 20°C, should we not recognize this and refer the horsepower ratings to this temperature? It is apparent that two motors of similar capacity can be nameplated in two different ways. One may present a more favorable impression than the other although they both may mean the same. A standard should be set up which will eliminate such differences.

CABLE INSULATION

GEO. W. ACOCK

IT has been recognized for some time that the wide range of cable types and sizes used in the industry for any given horsepower rating of motors and controllers has imposed a serious burden on both manufacturers and users, and has caused much delay and unnecessary cost in manufacture and use.

To alleviate this condition, a subcommittee under the chairmanship of J. A. Buss has made a study of the problem and has developed Recommendations for Cable and Hose Conduit Sizes for general purpose U.S.B.M. explosion proof motors. Attention is directed to the following:

- (1) Only general purpose continuous duty motors such as normally listed in motor manufacturers' price books are included. No attempt has been made to cover special motors specifically designed for "built in" applications on mining machines, as these generally have special cable requirements dictated by factors other than horsepower rating.
- (2) It is recommended that the same size cable be used for a given horsepower rating regardless of whether

the rating is for 60-minute duty or continuous. For duty ratings of less than 60 minutes, a study of the application may indicate that a smaller cable may be used to advantage.

- (3) Type W cables with a rubber-like covering conforming to requirements of Bureau of Mines Schedule 2E and I.P.C.E.A. Standard S-19-81 are recommended. Cables of AVA or AVC construction do not have sufficient usage with general purpose motors to warrant a standard, however, it is recommended that, whenever used, they conform in outside diameter to some diameter of the table for rubber-like cable.
- (4) Because of the small percentage of 550 v (500 v) equipment, it is recommended that the size of cable be based on the 230 v (250 v) requirement of the same horsepower.

SURFACE PREPARATION

Committee Chairman
T. W. GUY

PREPARATION PROBLEMS OF FULL SEAM MINING

D. H. DOWLIN

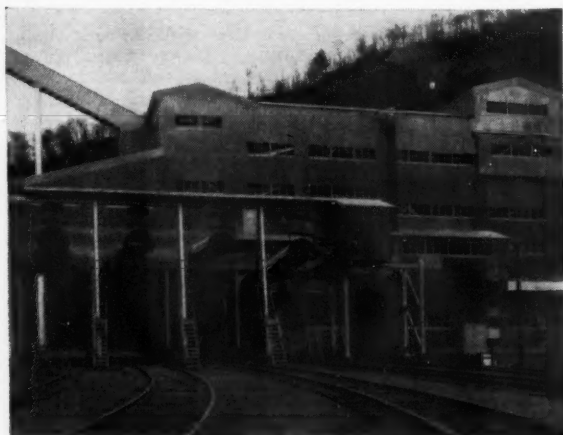
PURPOSE of this study is to determine when seam conditions, partings, character of the coal, etc., are such that the underground advantages of full seam mechanical mining are offset by the difficulties imposed on the surface preparation plant. The case histories, summarized below, will be the basis for any conclusions that may subsequently be drawn by the committee.

REPORT A

R. A. LEWIS

THIS account describes the slate handling methods and gives data on an operation that has used full seam mining for several years. Two seams of coal, the No. 2 Gas and Powellton, are mined. Where the seams unite and where the interval is not over three ft, the seams are mined together full seam mining. The conventional method of undercutting and mechanically loading into mine cars is used.

At the head house the raw product is put over a scalping screen. Large rock is conveyed to a rock crusher, which is located on the top of a large bin. Crushed rock is con-



Continuous mining introduces new preparation factors

veyed from this bin to the refuse pile by an aerial tram. No slate is gobbled. About 20 percent of the total tonnage mined at the face is rejects.

Following are the outside slate handling costs:

- Hauling slate to head house—0.0405 cents per ton clean coal (labor)
- Mechanical cleaning—0.1448 cents per ton clean coal (labor)
- Refuse—aerial tram—0.0150 cents per ton clean coal (labor)

REPORT B—WINIFREDE SEAM—WEST VIRGINIA

R. L. LLEWELLYN

THIS coal seam varies in thickness from 60 to 70 in. and contains several streaks of slate impurities all of which are mined, run of face. The total seam is mined, with no underground gobbing, and sent to the cleaning plant where pickers remove the plus five-in. slate on a shaker screening table. A separate scalper deck is provided to permit the plus ten-in. slate to be discharged directly into the refuse bin without handling while any coal in this size is diverted back into the coal by a man. Plus five-in. coal is crushed to minus five in. and is combined with the natural 5 in. by 0 for prescreening ahead of the washer. The ¼ in. by 0 is removed on vibrating screens where the slack is by-passed to the cleaned product. The 5 in. by ¼ in. is washed in a jig and dewatered on vibrating screens. Approximately 68 percent of the coal is washed and 32 percent is slack which is by-passed.

During a six-month period in 1952, about 175,600 tons of clean coal were shipped and 64,500 tons of refuse were handled by trucks. Costs per ton of clean coal are tabulated below. The washing cost is not typical—coal is loaded into barges and therefore the manpower is unusually low at the cleaning plant.

- \$0.055—Hand Picking
- \$0.078—Washing
- \$0.041—Trucking of Refuse

It is to be noted that the above costs include only labor and maintenance. Depreciation, amortization, overhead, taxes, insurance, etc., must be added to the indicated costs. Also, as truck haulage distance becomes longer refuse trucking costs will increase.

REPORT ON MINE D

V. D. HANSON AND J. M. VONFELD

THIS plant furnishes raw coal to a central cleaning plant. Eleven years ago an aerial tram to handle approximately 250 tph was installed to dispose of mine rock. In the ensuing years the amount handled by the aerial tram has decreased to about 300 tph of mine rock. The remainder of the rock is now handled as part of the seam mined.

The raw coal material handling system at this point is now wholly inadequate, and the possibility of a complete revamping is being investigated. Eleven years ago a 48-in. belt was found sufficient to handle the largest rock mined at most operations. Now it is wholly inadequate. Scalpers have been installed to remove the plus 14 to 16-in. material. However, rehandling this rock, many pieces of which weigh over one ton, poses a number of difficulties such as; destruction of bin bottoms, conveyor flights, chains, and loading booms.

It would not be economically feasible to change the feeder set-up at the central plant to handle this size because of the very nature of the original installation, so the changes have to be made at the raw plant. The result of all of these changes is that an extensive layout of money was necessary in order to properly handle the slate. At the central plant over 17,000 tons of raw coal a day are cleaned. About 5000 tons of this is disposed of as refuse. This presents the problem of disposal without air and water pollution.

PREPARATION PROBLEMS OF CONTINUOUS MINING

F. P. CALHOUN

FOLLOWING the plan set up at its last meeting the committee has collected data on actual operations. Accounts of cleaning coal mined by continuous mining have been submitted giving size consist and preparation data as summarized below. These cover six different operations in which three types of continuous machines are used. There are five coal seams involved with heights varying from 40 to 84 in.; geographical location ranging from central Pennsylvania to central Illinois. Further histories are to be compiled before the report is completed.

REPORT ON MINE A

L. A. SHERWIN

THIS operation is in the Pittsburgh seam. There are three small binders in the seam ranging from $\frac{1}{2}$ to two in. The mine run feed at 300 tph is sized into plus 5 in., 5 by $\frac{3}{4}$ in. and minus $\frac{3}{4}$ in. Screening area is ample except when high moisture is encountered. The 5 by $\frac{3}{4}$ in. is cleaned in a diaphragm jig with dewatering and sizing after cleaning.

Screen analysis shows that in comparison with conventional mining the quantity of plus 5 in. and 5 by $\frac{3}{4}$ in. material will be reduced 53 percent and 17 percent respectively and the minus $\frac{3}{4}$ in. increased by 39 percent. The major preparation problem lies in the one percent greater moisture in continuous miner coal over conventionally mined coal. This moisture is due to the greater amount of spray water required for dust control purposes.

REPORT ON MINE B

F. P. CALHOUN

THIS operation mines the Upper Freeport Seam—40 to 46 in. of coal with a one-in. binder (high ash) six in. from the fireclay bottom. The preparation plant crushes to 4 in., dry screening at $\frac{3}{4}$ in., sand flotation on plus $\frac{3}{4}$ in. and concentrator tables on minus $\frac{3}{4}$ in., heat drying on $\frac{3}{4}$ in. by 0 sizes.

The effect of continuous mining, with two types of machines is to reduce the capacity of the plant which was designed for coal produced by conventional methods, cutting, shooting and loading. Clean coal quality is not materially affected by continuous mining.

REPORT ON MINE C

F. P. CALHOUN

THIS operation is in the Miller "B" Seam—40 to 45 in. thick. The seam contains streaks of pyritic sulphur, a band of high ash binder about one in. thick, six in. from the fireclay bottom and six in. of boney above the coal seam. In some places the boney adheres to the slate roof and is left up. In other places it must be taken down. Occasional bottom rolls occur.

The preparation plant consists of a Bradford Breaker which reduces the mine run to minus $\frac{3}{4}$ -in. size and rejects about 15 percent of the normal machine loaded coal containing the top boney. The $\frac{3}{4}$ in. by 0 is screened at $\frac{3}{16}$ in. and the plus $\frac{3}{16}$ in. cleaned in a sand cone. The minus $\frac{3}{16}$ in. is air cleaned by air boxes, with concentrator tables to recover coal from the air plant reject.

Continuous machines were used for several months under various working conditions. They eventually proved to affect the quality of the clean coal. The screen analyses of raw coal after the Bradford Breaker of both types of mining, show that the sizing is not very different but the continuous mined coal contained more impurities in all sizes.

REPORT ON MINE D

T. L. GARWOOD

IN mining the No. 6 Illinois seam all impurities within the seam are mined and sent to the cleaner with only one exception. Continuous mining in this area is by a machine mounted on caterpillar treads.

Most of the area's preparation plants are equipped with jigs of 600 to 700 tph capacity some having special equipment for wet or dry cleaning fine coal. One plant is equipped with two jigs and six air tables. Hand picking is done on plus six-in. coal or it is crushed and returned to the mine-run feed, six-in. by $\frac{3}{4}$ -in. coal is jigged and the minus $\frac{3}{4}$ -in. coal is cleaned on air tables with the refuse and middlings from the tables going to the jig feed for recovery. Middlings from the jigs are screened at one-in. and the through material discarded to refuse, the plus one in. is crushed and fed to the jigs with the regular six in. by $\frac{3}{4}$ -in. coal. So far as can be noted, impurities in the seam do not affect the operation of the plant to any great extent either in quality or size.

The major problem in continuous mining at this operation is to keep the machines within seam limits, preventing the inclusion of fireclay or top shale in the coal going to the cleaner.



More than 200 attended the Coal Division Conference luncheon meeting

REPORT ON MINE E
RALPH PRICE AND WM. CONNELLY

THIS company has operated continuous mining in the "B" or Lower Kittanning seam and in the "D" or Lower Freeport seam. The cleaning plants use sand flotation.

The first continuous machine was installed in the "B" seam December 12, 1949, and additional miners were installed later. All of the coal loaded from the "B" seam is produced by continuous mining. Seventy percent of the coal loaded in the "D" seam is from continuous miners. At the other operation in the "D" seam, 40 percent of the coal loaded is from continuous miners.

Experience shows that continuous mining has increased the $\frac{1}{4}$ in. sq. by 0 fines, the moisture and the ash. At the present time there are no facilities for treating $\frac{1}{4}$ -in. sq. by 0 coal. The high moisture content of the coal, due to spraying at the face, causes difficulty in screening. Therefore, because of incomplete screening a large percentage of $\frac{1}{4}$ in. sq. by 0 passes into the cone and more moisture is added.

In thin seam mining it is difficult to keep the continuous machines from cutting into top and bottom. Vision is poor due to fog from the spray water. Extensive experiments with different types of sprays to try to reduce the amount of water at the face are in progress and showing results.

FREEZE PREVENTION

R. A. JIMENEZ

THE problem of freeze prevention of coal for winter shipment is one of obvious importance to those faced with the necessity of solving it. Yet it is one which up to the present time has defied what might be termed a standardized solution. However, on close examination it would seem fallacious to consider the existence of a standardized solution to a problem so subject to widely varying conditions.

It is for this reason that no attempt will be made to draw rigid conclusions and make specific recommendations. Rather the following report will confine itself to a discussion of the various possible methods of preventing the freezing of coal in transit, and of the various methods presently used for handling frozen coal at the point of destination. It is left to the reader to make the necessary comparisons and judgments to decide which of the methods discussed is most economical and otherwise best suited to his particular condition and application.

In order to initiate discussion and collective thinking on the part of this subcommittee, the following list of topics were selected as pertinent to the subject of freezing and freeze-proofing of coal for winter shipment: (1) Effects of freezing; (2) mechanics of freezing; (3) methods of loading; (4) mechanical dewatering; (5) heat drying; (6) oil treatment; (7) chemical treatment; (8) methods of unloading. Summaries of actual operation, as submitted by the committee, are given in the following.

METHODS TO PREVENT COAL FREEZING IN SHIPMENT

JAMES J. MERLE

Effects of Freezing. The chief complaint is inability to unload frozen coal without incurring lost time and subsequent higher unloading costs and possible interruption to plant operation. It is not uncommon for frozen coal to reduce the unloading rate by 50 percent or more.

Mechanics of Freezing. Degree of freezing varies directly with surface moisture content, time of exposure, and temperature. The amount of fines present also has a direct bearing on freezing. Fines retain moisture, prevent

drainage, and absorb and/or adsorb moisture from the larger particles of coal in the car.

Methods of Loading. During the winter many empty cars contain snow. It is not difficult to imagine the consequences of loading coal into several feet of snow.

Mechanical Dewatering. Mechanical dewatering is not satisfactory except for coal larger than $1\frac{1}{4}$ in. Efficient centrifuging of $\frac{1}{4}$ in. by 0 prevents freezing during most of the winter, in sub-zero weather, coal will freeze to a depth of two or three in. along the sides and bottoms of cars.

Heat Drying. Efficient thermal drying is very effective in preventing freezing. One company has never had complaints about 100 percent thermally-dried coal or a mixture of thermally-dried coal and centrifuged coal. There are no deleterious effects as the result of heat drying either in the production of fines, or in reduction of Btu.

Oil Treatment. This company uses oil treatment (spraying) for de-dusting only. The concentration is from three to eight quarts per ton at viscosities from 600 to 3500 depending on the coal seam being mined. Oil treating, as far as those coals are concerned, is ineffective in preventing freezing.

Chemical Treatment. There are claims that certain compounds will reduce surface moisture by reducing surface tension of the water and thus facilitate its removal by mechanical screening so that the product will not freeze. However, experience at these mines is that thermal drying is the only effective way to completely freeze-proof coal. Surface moisture must be reduced to two percent or under. Besides freeze-proofing, thermal drying increases the as-fired Btu and is a powerful incentive to sales appeal.

MECHANICAL CAR UNLOADER FOR FROZEN COAL

A. G. GILBERT

THE task of providing coal to a power plant really gets rugged in the wintertime when the fuel freezes solid in the cars. At a power plant in Michigan the difficulty of unloading cars of frozen coal was severe and to meet this problem, a mechanical unloader was installed and placed in service in December, 1947. Its major feature is the force with which it can drive the sharp spade on the end of its ram down through the coal in a frozen coal car. It consists of the following units: (1) a traveling bridge structure; (2) a traveling trolley; (3) a retractable and oscillating ram, and (4) the operator's cab and controls. The ram is raised and lowered by a 20-hp, dc motor equipped with a magnetic brake. A full stroke of a little over 14 ft is given the ram through its rack and pinion drive and the spade can be pushed down into a loaded car with a force of about 20,000 lb.





A mining company's most valuable asset is its ore deposit

Periodic Mine Revaluation

Annual Audit of Basic Value of a Mining Enterprise Provides Realistic View of Financial Position in These Changing Times

THE asset of primary importance to a mining company is its ore deposit. Its value and usefulness depend upon its ability to yield profits. The success of operation lies in the factors of cost, efficiency in production, price of product, and various other elements. These factors undergo constant changes with an accompanying fluctuation in the value of the orebody itself. Financial audits, insofar as the value of the orebody is concerned, are, nevertheless, usually confined to a statement of depletion charges covering the audit period.

Few mineral operations follow the practice of revaluing ore deposits at regular intervals. Yet variations in the value of orebodies may be more important than other current changes in the financial position. Without such revaluations, the balance sheet obviously fails to reflect the real worth of the company as a whole.

Precipitous price changes sometimes occur even in such relatively stable materials as copper, lead and zinc; and when prices fall, large tonnages of ore may have to be reduced or entirely eliminated as active realizable components of asset value. The anticipated life of the mine and the rate of operation may then need revision. Conversely, price increases would serve to increase ore reserves and to

By **SAMUEL H. DOLBEAR**

Consulting Mining Engineer
Behre Dolbear & Co., New York

establish higher asset values and estimated earnings.

When the price of gold was advanced from \$20.67 to \$35.00 an ounce, gold mines were revalued to establish the earning outlook and the property-worth at the new figures. Mines with by-product gold also found themselves in possession of additional income and extensions of ore value capable of capitalization on the balance sheet.

For the most part, the change in asset value brought about by variations in price of the product, volume of market, competition and cost of production are not reflected in the balance sheet except at irregular intervals when revaluation is required as an incident to financing, sale or for other purposes.

Audit Often Misleading

Each year the annual financial audit of a mining company involves a major operation. Included in the audit is usually an item of Fixed Asset Value

of Mineral Deposits at a figure carried, year after year without change, except to show a balance after deducting depletion.

That this practice has been seriously misleading is illustrated vividly in two cases in which the writer was engaged in revaluation. In one, the book value of a mine had been reduced by depletion to about \$750,000 notwithstanding that earnings were in excess of two million dollars annually, and that ore reserves sufficient for many years had been developed. In another case the mine had been sold for more than eight million dollars. Valuation had been fixed by U. S. tax authorities at \$750,000 nearly 20 years before, and the company, an American-owned foreign corporation, had neglected to revalue the mine on an adequate basis. As a result, after completing the sale it was discovered that the mine had been overdepleted by \$2,000,000. Tax authorities held that the sales price plus the overdepletion—a total of more than ten million dollars—should be regarded as net earnings rather than capital gains and should be taxed accordingly.

Without a revaluation involving a reduction of future earnings to present worth by the Hoskold or similar premise, a statement of net asset value of the mine (and of its capital stock)

is certain to be inaccurate and may be substantially misleading.

Fixed Assets Vary

The part in asset worth being constantly played by technological progress is another influence requiring periodic appraisal. The development of froth flotation 35 years ago created immense ore reserves, transforming rock into profitable ore by the increase of metal recovery and reduction in cost. This is, of course, one of the more spectacular individual influences. There are others hardly less important, as for example, the application of block caving to mineral masses uneconomic to mine by any other methods. The creation of tens of millions of dollars of value in sulphur by the Frasch process is another case in point. The total wealth created by thousands of other relatively minor technical improvements would be difficult to appraise.

Ore estimates based on the most careful sampling and weighted appraisal, necessarily will differ in some degree from results realized by actual mining and treatment of the ore. It is not a practical matter to correct this disparity at short intervals. To the extent of this difference an error, cumulative from year to year, is present in the Fixed Asset figures. This can be corrected only by periodic re-appraisal. Another element undergoing constant change is brought about by new exploration and development. Asset values are incomplete until new ore, reduced to a basis of present worth, has been included.

Annual revaluation is in effect an annual audit of the basic value of the enterprise. It is an undertaking of considerable magnitude, but hardly more burdensome than the annual financial audit. In its absence the balance sheet fails to reflect the gain or loss of asset value attributable to ore deposits. It is difficult to understand why a matter so fundamental as this has been so habitually neglected.

Effect of Economic Changes

Appraisals of the value of mineral deposits are usually confined to those with an expected operating life of several years. Economic changes affecting value are constantly at work on almost every element contributing to the asset worth.

In the present era we are dealing in the United States with major influences not heretofore so conspicuous. A national debt of unprecedented size, government controls over private industry, the clamor of labor for a voice in management, and pressure for legislation covering a "welfare" philosophy, all require measurement from time to time in terms of present and future. In the mineral industries, concern must be felt for the repeated

efforts in high places to eliminate depletion allowances. So far this has been prevented by the fact that almost every state has important mineral industries and there has been an alert realization that elimination of depletion would have a destructive effect on production and employment. Changes in depletion rates occur from time to time and these have an immediate effect on profits and value. Repeated attempts to repeal the depletion laws do, however, illustrate the uncertainty of outlook present in some of the fundamental factors involved. Problems of political character are, of course, not limited to the United States. Instability of values arising from threats of nationalization or other forms of expropriation, the imposition of currency controls and burdensome export regulations, to mention a few, are present in so many foreign countries that in some cases they may reduce an otherwise profitable project to one in which the risk is too high to justify investment.

Gold Provides Measure

Valuation must necessarily be expressed in terms of gold or the currency of some nation, and be based upon the realizable profit to be gained by operation, expressed in monetary figures.

While gold is by far a more stable element than currency, even gold has had a variable career during recent years with \$35.00 an ounce as a legal figure in the United States, but with higher prices, both officially and unofficially, prevailing in many other parts of the world. Gold occupies a unique place among minerals as it is both a mine product and a measure of value of other mine products. Periodic valuation expressed in terms of ounces of gold or in purchasing power of currency for the year of the valuation provides comparable figures.

Valuation requires an assumption of some continuing relationship between cost of production on one hand and the unit price of output on the other. An increase in cost, without a corresponding adjustment in selling price, has the immediate effect of reducing the margin of profit and along with it the worth of the property. Reduction of profit and resultant loss of value may, of course, be due entirely to increases in taxation, price control or other artificial manipulation of the economy by government act.

In long-term operations it is reasonable to assume that the spread between operating cost and selling price may be relatively consistent, in the absence of some basic element of competition. There is need, of course, of a sufficient length of time for the selling price of the product to adjust itself to changes in cost. Some cost changes are predictable, such for ex-

ample as the relative increase in cost of mining at depth as against operations near the surface, the over-all unit cost increase that usually follows a decrease in the grade or character of ore, that due to a change in roof conditions, or the cost of pumping as operations reach the water level.

Review Risk Factors

There are certain intangible factors, such as cost increases due to legislation, which are not predictable, nor are the application of government controls permitting wage increases but not corresponding price increases. The uncertainty created by these intangibles cannot be measured in cents per ton, but must be appraised in determining the risk rate to be used in a Hoskold type of valuation.

Notwithstanding the rather complex pattern presented by these influences, it is possible to weigh these factors and to establish a reasonable value for mineral operations, based on the relation of estimated production (earnings) capacity to the risk involved. Heretofore it has been the practice to weigh the risk factors and to adopt a uniform speculative rate for the life of the operation. Periodic revaluation provides an opportunity to reexamine these risks and to make whatever adjustments for risk factors that may be indicated.

Valuation Premises Revised

A number of formulas have been developed for the reduction of future earnings to present worth, with procedures to absorb the speculative risks. That devised by H. P. Hoskold in 1877 has been utilized more than others and has come to be the commonly accepted valuation premise. If periodic valuation is to be adopted, then the Hoskold and other schemes based upon the acceptance of average yields for the life of the mine, must be revised to permit adjustment at whatever interval is considered appropriate.

Under the Hoskold plan, it is assumed that upon purchasing a mine, the owner is entitled to receive profits at an annual rate compatible with the risk involved. This is designated as the "Risk Rate." A sinking fund is set up to which annual payments are made. This is composed of the difference between the annual estimated earnings and the dividend required by the risk rate. The sinking fund often varies from year to year. If the annual earnings are less than the dividend required for that year, then the deficit is paid from sinking fund accumulations. Payments into the sinking fund are invested in "safe" securities such as high grade bonds. The interest on these, together with sinking fund payments, are expected to be sufficient to repay the original investment upon exhaustion of the mine.

Hence the term "Safe Rate." The use of the Hoskold formula for uniform and non-uniform income is discussed in detail in "Examination and Valuation of Mineral Property" by Roland D. Parks.*

Heretofore, in using the Hoskold premise, it has been frequent practice to estimate the average grade of the entire orebody and to use a figure of average cost of production for the entire mass. Under this plan, a total profit of \$5,000,000 to be realized in 15 years, using 10 percent risk rate and 4 percent safe rate, would have a present value of \$2,223,100. Because this procedure averages the total profit over the entire tonnage, and ignores the year to year fluctuation in yield, risk and reserves, the resultant value may be entirely too high or too low. Some changes are needed in this procedure to meet the requirements of an annual revaluation. The Parks premise is designed for this purpose.

The Parks Premise

In most operations, there are found sufficient variations in the grade of ore and operating conditions in different parts of the orebody to result in substantial differences in income from year to year. In an extensive valuation carried out a few years ago by Samuel H. Dolbear and Roland D. Parks, of Behre Dolbear & Co., a formula to meet this requirement was first used. This formula, a development by Professor Parks, is as follows:

$$V_p = \frac{\text{(sum of } P_m R \text{ series)}}{1 + r' \frac{R_n - 1}{r}}$$

in which

- V_p = present value as of the date of the valuation
- P = yearly profit (may vary each year)
- R = \$1.00 + 1 year's interest @ r rate
- n = years life of operation
- m = specific year in which income P is received
- r' = speculative (risk) rate
- r = safe rate

Each year's earnings, designated as P_1, P_2, P_3 , etc. to P_n , are separated into two portions; first, the annual speculative (risk) interest return V_{pr} on the invested capital, and, second, the balance ($P - V_{pr}$), which is allocated to the sinking fund. The speculative interest return is uniform throughout the life, being a simple interest return on the investment. Since the annual earnings vary from year to year, the balance left for the sinking fund also varies, and, at times, may even be negative in amount, as when the earnings for a given year

are insufficient to cover the speculative interest payment. Such deficits in sinking fund are replaced by later earnings. The sinking fund with accrued interest at the "safe" rate becomes the present value (investment) at the end of the life period.

Thus, the investor receives a uniform return each year on his capital at the speculative rate and the annual balances remaining are accrued as a non-uniform series carrying interest at the "safe" rate to repay the invested capital when operations cease.

A valuation is based on an estimate of future operations. It is valid only for a specified set of conditions. Whenever the conditions are altered, such as an extension or contraction of life, or a change in net yield, or in operating rate, a new valuation is called for.

The estimated future earnings may be reduced to present worth in one of two ways:

- (1) Use of the formula given above.
- (2) Accruing the series of annual sinking fund payments at the safe rate of interest to the end of the life period. The sinking fund payments, in this case, are the balances left after deduction of the speculative interest from the respective annual net earnings.

If the estimated future earnings are uniform in amount each year, then the total of such earnings for the entire life period may be present-valued directly by appropriate discount factors.

It should be understood that P , the yearly profit or net earnings (after taxes, if such are considered) equals the speculative interest payment plus the sinking fund payment. When the P series is uneven (that is, a series of non-uniform annual earnings) the way to reduce them to present value is by the formula as given.

As an alternative, the speculative interest, when determined, can be deducted from the respective annual net earnings (P) and the sinking fund balances accrued at the safe rate. But this procedure requires that the present value be known in advance and is therefore not always applicable.

If a mine is under option at a price of \$10,000,000, and the problem is to determine whether or not this is a reasonable price from the purchaser's point of view, then the first factor to determine is the risk rate. Assuming this to be fixed at eight percent, then the mine must first earn eight percent of \$10,000,000 annually, or \$800,000 per year to cover the speculative return. Earnings in excess of this will be accumulated in a sinking fund and draw, say, four percent cumulatively, for the life of the mine. If the sinking fund plus interest equals or is in excess of \$10,000,000 at the estimated

time of exhaustion, the price is assumed to justify purchase. Whenever the earnings may be estimated for each of the operating years, the present value may be calculated directly as a check against the option price.

Factors Influencing Value

It is not proposed here to examine at length the numerous factors customarily present in valuation, nor all of those which may require detailed analysis to determine periodic earnings or periodic risks. However, because certain of the factors normally used in valuations are variable and play especially important parts in periodic appraisal, they are discussed briefly. Some of these elements are of temporary character but they may have a profound effect on the long term risk position and, therefore, the attractiveness of a specific venture. The provision of government money, repayable only out of production, and the application of accelerated depreciation on mineral projects required for defense, are examples of this character. Problems of valuation in foreign areas, the influence of government controls of prices, markets and uses, effect of current technical progress stimulated by the defense effort are also factors to be considered.

Realize Important Benefits

In the foregoing there are discussed some of the variations in the visible and invisible influences which affect the value of mineral deposits. During years preceding 1932 and the so-called "economic revolution," business cycles and the "law of demand and supply" served as primary guides in business forecasting. In this era of pump-priming, government controls of one kind or another, and varying degrees of socialistic thinking and practice, not only in foreign countries but in the United States, business enterprise can hardly expect to operate at maximum efficiency without full available knowledge of these influences and their possible effect on the present and future. In advising more frequent revaluation of mineral deposits at regular intervals, the purpose is not merely to produce a value measured in current terms, but also to reappraise all the elements which enter into the composition of value. It must be evident that the casual or occasional use of economic yardsticks heretofore employed are inadequate in these years of economic change.

Periodic revaluation provides information important to management and essential to shareholders.

Annual revaluation is in effect an annual audit of the basic value of the enterprise.

Acknowledgment is made to Roland D. Parks and Parke A. Hodges for helpful suggestions and advice in the preparation of this paper.

* Examination and Valuation of Mineral Property.—Roland D. Parks 1949 Addison-Wesley Press Inc.

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Many mines are careful to preserve their cables and keep them in perfect condition at all times. Temporary splices made in the mine with regulation Canton "Quick-on" Splicers have all the strength, conductivity and spoolability required for many days' work, but the tape frays and wears out more quickly than the smooth hard rubber insulation of a vulcanized job. Vulcanized splices are always superior as the cable is less apt to snag on a rough corner rib or get caught in rail frog, for instance. Whereas taping would be damaged, hard rubber vulcanized joints would come through such usage unharmed. For these reasons it is the custom to replace spliced cables and make permanent vulcanized splices in the shop before permitting severed cables to re-enter the mine.

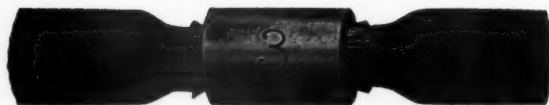
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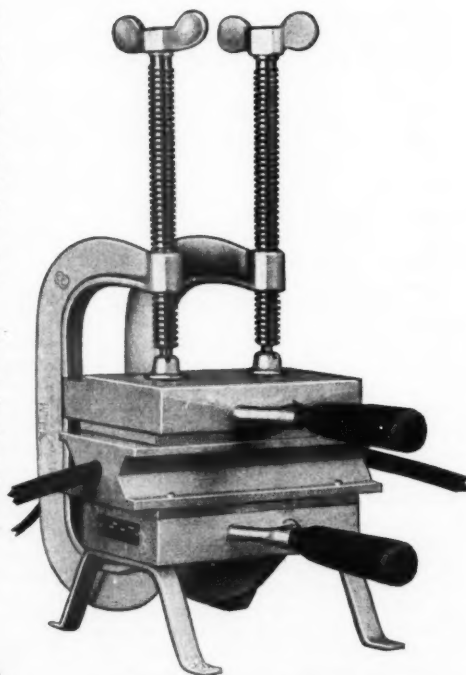
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Wheels of GOVERNMENT



As Viewed by A. W. DICKINSON of the American Mining Congress

PREVIOUS to his departure for Korea, President-elect Eisenhower selected a Cabinet which on the whole has met with the approval of the nation. Cabinet members-designate are conferring with the officials in the present Administration whom they will succeed after January 20, and all signs point to an orderly transition to the new Government.

The completed Cabinet post selections now include: John Foster Dulles, Secretary of State; George M. Humphrey, Secretary of the Treasury; Charles E. Wilson, Secretary of Defense; Governor Douglas McKay of Oregon, Secretary of the Interior; Herbert Brownell, Attorney General; Ezra Taft Benson, Secretary of Agriculture; Arthur E. Summerfield, Postmaster General; Sinclair Weeks, Secretary of Commerce; Martin T. Durkin, Secretary of Labor; together with Harold Stassen, Director of Mutual Security Agencies.

An outstanding example of the able White House staff now being assembled is that of Sherman Adams, now Governor of New Hampshire, to take over the place now held by John R. Steelman.

Taxation

Experienced observers feel that there will be little in the field of tax legislation before June 30, the date when the excess profits tax is scheduled to expire. Incoming Ways and Means Committee Chairman Dan Reed of New York has announced that he will introduce a bill to reduce the individual income tax by 5 percentage points effective June 30, but it is difficult to say at this time what action may be taken on such a bill. The 10 or 11 percent increase in the individual income tax made in 1950 is due to expire on December 31, 1953, and the Congress may readily decide to allow the law, as it is, to take its course.

Tax Court—Stripping

Several cases have arisen in recent years where independent contractors engaged in the strip mining of coal land for mining companies have claimed a percentage depletion allowance, thereby reducing the allowance taken by the companies.

In a ruling recently handed down by the U. S. Tax Court in the case of the Morrisdale Coal Mining Co. of Pennsylvania, the Court declares that the Commissioner erred in computing percentage depletion by reducing the petitioner's (the Company's) gross income by an amount equal to that paid the independent strip-mining contractors. The Court ruled that the contractors did not acquire an "economic interest" in the property.

The Court went on to say: "Most of the cases in which depletion has been allowed to an independent contractor have involved situations where the producer or miner of the mineral or other depletable asset has received payment either in kind or as a percentage of the ultimate selling price or profit derived from the sale of the commodity. . . . Neither of such situations is present in the instant case. The independent contractors received a stated amount per ton for coal of good merchantable quality satisfactory to petitioner."

This is an important ruling which may well concern producers of many minerals in addition to coal.

Coal Wage

The full \$1.90 per shift increase in the underground day wage scale was approved by President Truman December 3, when he overruled the Wage Stabilization Board, which had stood firmly for limiting the increase to \$1.50. In an interview, Economic Stabilizer Putnam stated that the White House ruling was "not the one I would have made or would have recommended from a stabilization viewpoint."

★ ★ ★ ★ ★

Washington Highlights

CONGRESS: Plans Committee organization.

TAX: Coming action under study.

REGULATIONS: Numerous proposals published.

STRIPPING: Court rules on contractors.

COAL WAGE: White House grants \$1.90.

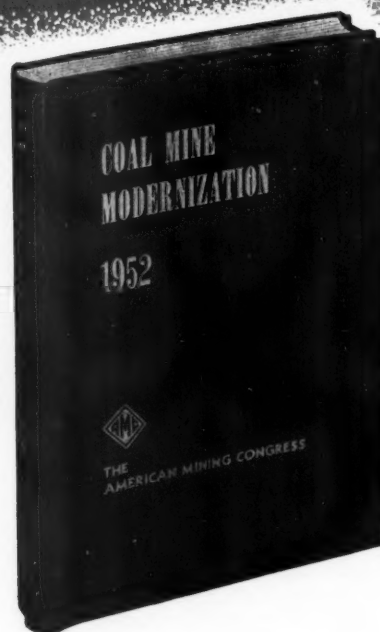
★ ★ ★ ★ ★

President Truman gave as his reason for granting the increase, that it was his purpose to provide "as calm and stable an atmosphere as possible" for General Eisenhower's incoming Administration. He stated that otherwise a coal strike might complicate the transition. Many observers feel that the miners would not have struck again over the 40c difference in the wage scale or that John Lewis would not have been able to hold them out much longer on their original strike over this issue.

WSB Chairman Archibald Cox and all of the industry members of the Board have resigned as the result of the President's action. The industry members addressed a stinging rebuke to President Truman declaring that, "we cannot participate in a program which would require us to grant special privileges to a few, and make second-class citizens of all others." Their letter castigated the White House assertion that the pay increase was granted to save Eisenhower's Administration from embarrassment by saying, "It is impossible to turn over an 'effective' program after it has been emasculated . . . the farce reached its first climax in the steel decision of this past spring. Now the last pretense of firmness has been shattered. What is being turned over to the new Administration is nothing but a ghost of what might have been."

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Personals

Consolidation of the U. S. Atomic Energy Commission's uranium exploration and procurement programs on the Colorado Plateau under an Operations Office at Grand Junction, Colo., was announced by Jesse C. Johnson, Director of the AEC Division of Raw Materials.

Sheldon P. Wimpfen, who has been assistant director of the Division of Raw Materials in Washington, will be manager of the new Grand Junction Operations Office, reporting directly to Johnson. He assumed his new duties on December 1.



S. P. Wimpfen

Frank MacPherson, who has been manager of the Colorado Raw Materials Office, will be Director of Production in the new Operations Office, and will continue to have responsibility for ore buying, processing and uranium concentrate procurement. **Ernest Gordon**, chief of the Grand Junction Exploration Branch, will be Director of Exploration in the Plateau area.

George G. Gallagher, assistant director for domestic production, and **Philip L. Merritt**, assistant director for exploration, will continue to handle planning and technical direction of Colorado Plateau activities falling within their respective fields. Mr. Gallagher is stationed in Washington, D. C., and Mr. Merritt in New York.

Howard P. Gould has been appointed manager of the phosphate mining operations in Bartow, Fla., of Swift & Co. He succeeds **D. M. Wright**, who has retired.

Lehigh Navigation Coal Co. recently announced the appointments of **William M. Gillespie** as director of merchandising, and **Richard C. Newbold** as director of sales.

Gillespie joined the engineering department of the company in 1933, immediately after being graduated from Pennsylvania State College. After moving up through various depart-

ments, he was made assistant to the general sales manager in the Philadelphia office in 1946, and in 1950 became sales manager.

Newbold joined **Lehigh Navigation** in 1951 and later that year was appointed sales promotion manager.

In a later announcement **Lehigh** told of the appointments of **Joseph F. Lynam** as assistant to the director of merchandising, and **Raymond F. Hamel** as assistant to the director of sales.

Harvey J. Hakala, formerly head of U. S. Steel's Brazilian subsidiary, **Cia. Meridional de Mineracao**, which operated manganese mines, has returned to Duluth and resumed his post in the mining engineering department of **Oliver Iron Mining Division**. **Hakala** left Duluth in 1948 to join the Brazilian mining firm, and served as its president from 1950 until his return to the United States.

Edward G. Fox, president of **The Philadelphia and Reading Coal and Iron Co.**, has announced the appointment of **Irving S. Geer** as assistant to the director of research of the company. **Geer** joins the president's staff attached to the Philadelphia office.

His appointment became effective November 1, coincident with the appointment of **Dr. Robert J. Day** as director of research.

Henry K. Martin has been named manager of the Mining and Milling Machinery Division of the **Lake Shore Engineering Co.**, according to an announcement made by **F. A. Flodin**, president. **Martin** has been active in the mining and milling industry since 1926. For the last ten years he has been associated with **Oglebay, Norton & Co.**, engaged principally with the planning and development of **Reserve Mining Co.'s** taconite project in northern Minnesota.

Martin will continue his association with **Oglebay, Norton & Co.**, as a consultant.

Two organizational changes have been made at the **Wheelwright and Price Mines of the Inland Steel Co.** at **Wheelwright, Ky.** **Olney Collins** has been promoted from assistant mine foreman to safety inspector. **James Camp**, assistant mine foreman at

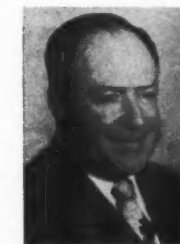
Price Mine No. 2 is now mine foreman at **Price Mine No. 1.**

The appointment of **Frank E. Johnson** as deputy administrator of **Defense Minerals Exploration Administration** was recently announced. **Johnson** has been special assistant to the administrator of **DMEA** since its organization, and has recently served as acting deputy administrator.

Chester H. Steele, vice-president in charge of Western operations for **Anaconda Copper Mining Co.**, has announced several promotions in the mining department of the company. **Arthur C. Bigley**, who has been manager of mines since January, 1951, became general manager of Western operations. **Edward I. Renouard** replaced **Bigley** as manager of mines and **A. R. Sims**, assistant general superintendent of



A. C. Bigley



E. I. Renouard



A. R. Sims

mines, replaced **Renouard** as general superintendent of mines.

At the same time **Steele** announced the appointment of **Edward Bonner, Jr.**, as assistant general superintendent of mines and the promotion of **Joseph Canavan** from assistant mine foreman to mine foreman of the **Belmont mine**.

W. P. Morris, resident manager of the Potash Div. of **Duval Sulphur & Potash Co.**, was elected president of the **New Mexico Mining Association** at its meeting in November.

John Marshall, president, **Pierce Management, Inc.**, left October 16 to visit Austria, Greece, India, Burma, Thailand and Japan in connection with the firm's mining activities. He will return November 30.

At a recent meeting of the board of directors of **Nassau Smelting & Refining Co., Inc.**, **Arthur C. Fegel** was elected vice-president in charge of operating and engineering. **Nassau Smelting & Refining Co.** is a subsidiary of the **Western Electric Co.**

Andrew Fletcher, president of St. Joseph Lead Co., has been elected president of the American Institute of Mining and Metallurgical Engineers, and will take office during its annual meeting in Los Angeles next February.



Andrew Fletcher



Leo Reinartz

Fletcher has been treasurer of the association since 1944 and a director for many years.

Named president-elect (in line for the presidency the following year) was Leo F. Reinartz, vice-president in charge of special operating development for Armco Steel Corp.

Earl E. Rich has resigned as general manager, treasurer and director of the Tug River Lumber Co. to accept a position as chief engineer with United States Steel Co. at Gary, W. Va. Rich has also been associated with the Peerless Coal and Coke Co.

John G. Hall, general superintendent at the Eureka Operation of Chief Consolidated Mining Co., has accepted a post as assistant plant manager of the National Lead Co.'s MacIntyre Development Corp. at Tahawus, N. Y.

George R. Eadie is now serving as assistant general superintendent of coal mines at McAlester, Okla., for the Loan Star Steel Co. He was formerly associated with United States Steel Co. and more recently with the Freeman Coal Mining Corp.

George F. Reed has joined the staff of the Arizona Department of Mineral Resources as a field engineer.

The Association of Mining Personnel Officers, in West Virginia, has elected Luther T. Powers, field employment manager for the Coal Division, Eastern Gas & Fuel Associates, as president. The association is a new organization established by 35 representatives of various companies. It meets monthly to improve qualifications and efficiency of its membership as personnel officers.

Milton F. Rose, Prescott, Ariz., is superintendent in charge of the development work at the Oro Flame mine in the Hassayampa district of Yavapai County, Ariz.

- Obituaries -

William E. Tissue, sales manager, New River Co., died recently in Beckley, W. Va. Mr. Tissue came to work for the New River Co. in 1911. At the time of his death he was the oldest employe from point of service in the general office of that organization.

Henry Morris Hartmann, 64, prominent western mining engineer, died recently in Salt Lake City. Mr. Hartmann was prominently identified with a number of western mining enterprises. He participated in the operation of the Sunset Mine, Wallace, Idaho, and the Ophir Hill Consolidated Mining Co., properties.

Frank Hudson, 50, operator of the Hudson Mining Co. since 1933, died in Picher, Okla., recently.

Lewis E. Hanley died in Wallace, Idaho, on November 17 at the age of 72. Mr. Hanley was chairman of the board of the Hecla Mining Co. and had retired as Hecla's president on May 24, 1951.



L. E. Hanley

He had spent 50 years with Hecla. In 1902 he joined the company as an assayer. In 1907 he went into the head office of the company as time-keeper and in 1910 was made secretary of the company. In 1923 he was elevated to the position of general mine superintendent.

He was first elected to the board of directors in 1932 and was named vice-president and treasurer of the company in 1936. In 1940 he was elected president and general manager, holding that office until his retirement in 1951.

As president of the mining company, Mr. Hanley made it his philosophy that, "In the morning my time belongs to the company; in the afternoon it belongs to the men." He was widely known and respected throughout the entire mining industry. The esteem in which he was held by his fellow men is typified by the action of the mayor of Wallace, who issued a proclamation requesting all stores in Wallace to be closed for one hour during Mr. Hanley's funeral services.

Edmund A. Smith, eastern Kentucky mining engineer, has passed away at Prestonsburg, Ky. Mr. Smith started his career at Wheelwright, Ky., in 1917. He spent the greater part of his time with the Elkhorn Coal Co.,

working up to the position of chief engineer. He also served as chief engineer for the Glogora Coal Co.

Walter George, 74, personnel manager at the Eagle-Picher Co. plant in Joplin, Mo., died in early November after a heart attack.

Henry Macon Rives, 69, died on December 1. A native Nevadan, he had always been associated with mining and achieved an enviable reputation in industry and government.

Mr. Rives joined the U.S.G.S. in 1905. Later he worked for the Pittsburgh Silver Creek Gold Mining Co. and in 1914 was named to the Nevada assembly. In 1915 he became secretary of the Nevada Industrial Commission resigning that post for one as secretary of the Nevada Mine Operators Association.

He was also secretary of the American Gold Conference, the Pan American Silver Conference, the American Silver Producers Association and served as a member of the board of governors of the American Mining Congress. Loss of Henry M. Rives' knowledge of mining industry problems is a sad blow to the industry, his state and the nation.

Marcus L. Anderson, 80, formerly engineer in charge of underground work for Tennessee Copper Co., died early in October in Knoxville, Tenn.

Col. John Adams Church, 67, a specialist on minerals with the Defense Materials Procurement Agency, died in Washington, D. C., following a brief illness, on November 10. Col. Church was widely known as an authority on world mineral supplies. At the time of his death he was special assistant to the director, foreign expansion division, of the Defense Materials Procurement Agency. He also served with the Economic Cooperation Administration during the past five years.

Dr. Walter G. McGuire, chairman of the executive committee of the Independent Pneumatic Tool Co., died recently in Chicago. A prominent Chicago physician, Dr. McGuire had been a member of the board of directors of Independent Pneumatic since 1932. He was placed on the executive committee in March of 1944 and made chairman of that committee on September 10, 1948.

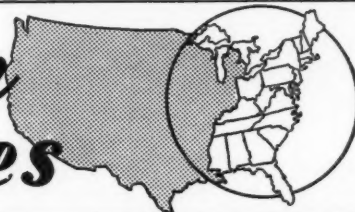


NEWS

and VIEWS



Eastern States



Building New Kiln

Appalachian Mining & Smelting Co. of Embreeville, Tenn., has begun construction of a Waelz kiln for zinc oxide production at its Bumpass Cove property. The kiln will be 140 ft long by nine ft in diam.

Initial mining operations at Bumpass Cove, where Appalachian Mining & Smelting Co. has 13,000 acres under lease, will be open pit mining of surface deposits. Later, underground mining may extend as deep as 1000 ft.

Honor Faithful Employees

Service records of from 20 to 50 years in the mines are being attained in 1952 by 248 mine workers at the mining operations of Eastern Gas and Fuel Associates in Pennsylvania, West Virginia and Kentucky, according to D. C. Stewart, manager of Eastern's industrial relations department.

They are among 1848 employees who have established long records of employment since 1948 when Eastern initiated the practice of awarding

service pins to veteran employees. This is the fifth year of the awards.

Six 50-year employees are: William Tyree, Sr., and Emmitt Williams, Carswell mine; Charles Carter, Eccles; C. B. Coleman, Gallagher; Edward Wright, Keystone, and Richard Wilson, Sonman mine. They attained their half century records as employees of Eastern and predecessor mining organizations.

There are 82 employees with 40-year records; 320 with 30-year records; 483 with 25-year records, and 957 men with 20 years of service, who have received recognitions during the past four years.

Service pins are being presented at ceremonies at the individual mines.

15-Year Contracts Signed

Five companies are to supply more than 7,000,000 tons of coal a year to two big power plants supplying electricity for the Pike County, Ohio, atomic energy plant project. Fifteen-year supply contracts have been signed with the five companies, it is reported. One power plant, to be built near Gallipolis, Ohio, will be supplied by North American Coal Co. of Cleveland and Pittsburgh Consolidation Coal Co. of Pittsburgh. Each will furnish 1,550,000 tons a year.

The other plant, at Madison, Ind., will be supplied by three firms. These companies with the tonnages they will supply are: Ayrshire Collieries, Indianapolis, 1,780,000 tons a year; Sinclair Coal Co. of Kansas City, 1,780,000 tons; and Green Coal Co., Owensboro, Ky., 395,000 tons.

Coal deliveries will start in October, 1954. Coal for the Indiana plant will come from mines in southern Indiana and western Kentucky. Ohio mines and possibly some in West Virginia will supply the Ohio plant.

Ask For Lower Freight Rate

C. J. Goodyear, traffic manager of The Philadelphia and Reading Coal and Iron Co., in late October urged the Interstate Commerce Commission to reduce the freight rate increase on anthracite to destinations along the Atlantic seaboard authorized earlier this year.

Goodyear referred to the rate increase of 12 percent with a maximum of forty cents a ton authorized by the I.C.C. last spring on application of the rail carriers. He made his recommendation in testimony on behalf of the Anthracite Institute at a hearing here before I.C.C. Examiner Burton E. Fuller on October 29, 1952. He pointed out that fuel markets in New England, the New York area, northern New Jersey and other points along the Atlantic seaboard which only a few years ago had been supplied to the extent of more than 60 percent of anthracite

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now are supplied about 60 percent by fuel oil.

The Philadelphia and Reading traffic expert called the Commission's attention to the fact that fuel oil moving into this Atlantic seaboard area is transported almost entirely by tank steamers to refineries or bulk stations and then distributed from these points by tank trucks or barges.

"This oil traffic," he said, "is rarely hauled by railroad, so that the railroads lose the business in the same fashion as it is lost by the anthracite producers."

Goodyear cited these circumstances to support his claim that the Commission had authorized too great an increase in the anthracite freight rates. He urged that the forty cent increase authorized last spring be reduced to a maximum of twenty cents a ton.

NCA Annual Meeting

Over 600 coal mining men attended the 35th Anniversary Convention and business meeting of the National Coal Association at the Waldorf-Astoria, New York, N. Y., November 10-12.

The program for the meeting embraced a series of discussions covering coal export problems, the activities of NCA committees, coal hydrogenation, foreign markets, taxes and Fed-

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eral legislation, fuels research, coal sales, and coal's relations with utilities.

A banquet was held on the evening of November 11, at which Rear Admiral Ellis M. Zacharias, (U.S.N. Ret'd.) discussed "Today's World—Tomorrow's Peace." On the following day Henry J. Taylor, noted economist and author spoke at a luncheon session outlining the Korean problem and the questions facing the foreign policy makers in the incoming administration.

Geologist Examination Announced

The United States Civil Service Commission has announced a Geologist examination for filling positions paying \$3,410 and \$4,205 a year in the Geological Survey of the Department of the Interior and various other Federal agencies in Washington, D. C., and throughout the United States.

All applicants for this examination must pass a written test and in addition must have had appropriate education and experience. The maximum age limit for \$3,410 jobs is 35, for \$4,205 jobs, 62.

Further information and application forms may be obtained at most first- and second-class post offices and from the U. S. Civil Service Commission, Washington 25, D. C. Applications should be sent to the Executive Secretary, Board of U. S. Civil Service Examiners, Geological Survey, Department of the Interior, Washington 25, D. C., where they must be received not later than January 6, 1953.

Monsanto Starts Mining

Monsanto Chemical Co., Columbia, Tenn., has announced plans for beginning limited mining operations near Franklin, Tenn., in early 1953. The mining will fill part of the company's needs for low-grade phosphate for electric-furnace production of elemental phosphorus at its Columbia plant. A loading tippie will be built on the L. & N. Railroad near Franklin.

Slide Headframe Into Place

A 134-ft permanent headframe has been erected at New Jersey Zinc Co.'s, Friedensville shaft at Friedensville, Pa. The 200-ton structure was erected in an area 67 ft from the shaft site. It took only three hours and 20 minutes for the Austin Co., engineers and builders of the surface facilities for the new mine, to move the headframe into position.

Much working time was saved by the novel method. Few headframes have been handled this way in the United States and this is by far the largest so handled, it is reported.



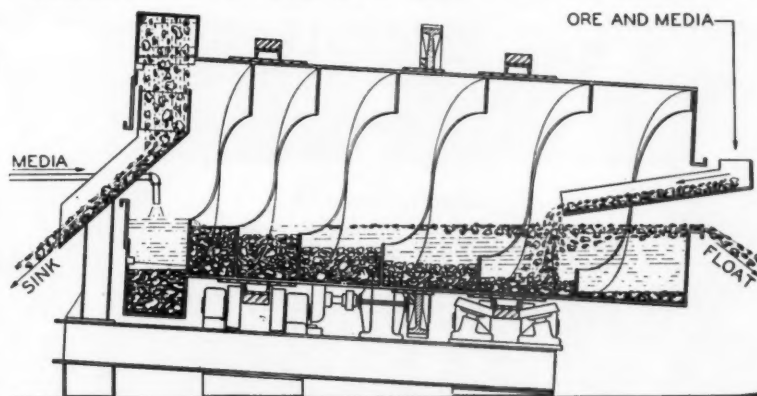
The Philadelphia & Reading Coal & Iron Co. received the first award ever made to American business or industry of a flag signifying 100 percent employee donor participation in the Red Cross Blood Program. The award was made at a luncheon given by the company at the Benjamin Franklin Hotel with the staff of its Philadelphia headquarters, company and Red Cross officials as guests. From left to right at the speaker's table are: Howard Price, vice-president and secretary of Philadelphia & Reading Coal; Benjamin Rush, Jr., chairman of the Southeastern Pennsylvania Red Cross Chapter; Edward V. Lynch, director of personnel for the company; and Rear Admiral Roscoe E. Schuirmann, USN (ret.), blood program chairman of the Central Philadelphia branch of Red Cross

Aerial Mappers Meet

The 19th Annual Meeting of the American Society of Photogrammetry will be held on January 14, 15, and 16, 1953, at the Shoreham Hotel in Washington, D. C. The program will be

highlighted by a panel on "Arctic Mapping" as a joint project of Canadian and American speakers and by a full day devoted to "Photo Interpretation" with its applications to the sciences, industry, and military intelligence.

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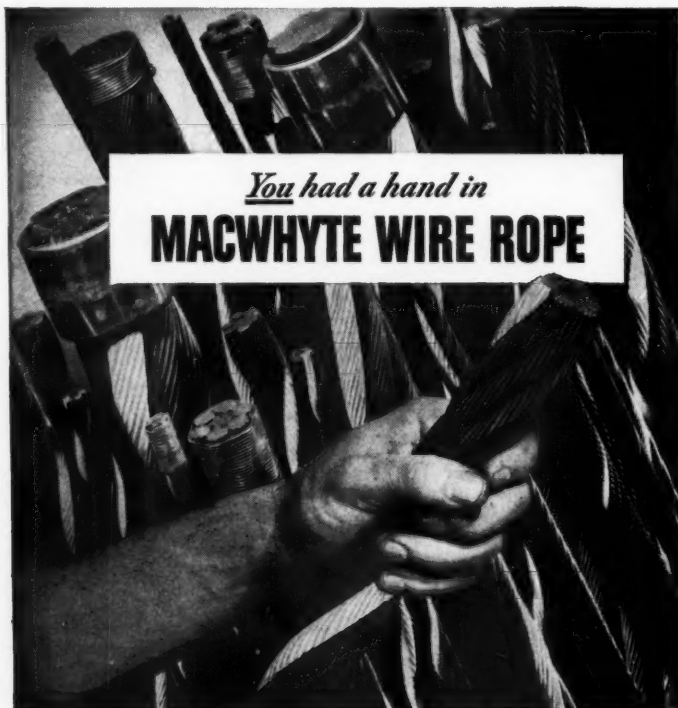
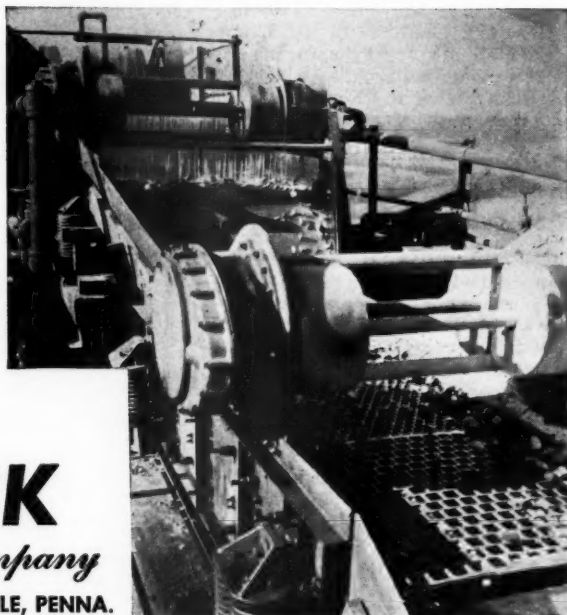
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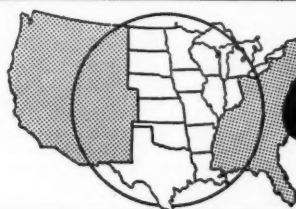
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Central States

New Rail Yard at Peabody 11

It was recently announced that the Wabash Railroad Co. has completed its yard and track installation at the new Peabody No. 11 coal mine near Tailorville, Ill. Track and yard facilities are capable of handling the entire daily output of coal from Mine 11 and will provide yard capacity for about 600 cars.

Contracts for the construction of the mine shaft are expected to be let soon. Entrance roads have been constructed and drainage established in the area.

Move Washing Plant

The Hill-Annex iron ore washing plant of the Minnesota ore division of Jones & Laughlin Steel Corp. is being moved to a new site at the edge of the Hill-Annex open pit mine at Calumet, Minn. The washing plant has been in operation for 30 years on its original site, about two miles from the mine.

Moving the plant to the mine site will eliminate a railroad haul. Ore will now come from the pit directly to the washing plant by way of belt conveyor.

Mining Institute Passes

A special meeting of the Lake Superior Mining Institute was held in Duluth, Minn., in mid-September to act on the dissolution of the organization. There had been a feeling among officers of the organization that under present-day activities, the original purposes and objects of the Institute have been taken over by other organizations.

The \$10,330.82 on hand in the treasury was divided as follows: The Greater University fund, University of Minnesota, was given \$3000 for undergraduate scholarships in the school of mines; and \$7,330.82 was given to the Alumni Foundation of Michigan College of Mining and Technology for the Memorial Union Fund. All papers and other items of a historical interest are to be deposited with the Marquette County Historical Society, Marquette, Mich.

The Institute was organized in 1893 to promote the arts and sciences connected with the economic production of the useful minerals and metals in

the Lake Superior region, and the welfare of those employed in these industries, by means of social intercourse, by excursions, and by reading and discussion of practical and professional papers, and to circulate, by means of publication among its members, the information thus obtained.

Building New Coal Dock

The Contracting Division of Dravo Corp., Pittsburgh, is constructing a new dock on the Mississippi River at St. Louis for unloading coal and loading coke barges. The project is part of a coke plant modernization project for the Great Lakes Carbon Corp., New York City. Fruin-Colnon Contracting Co., St. Louis, is general contractor.

Extending 887 ft along the waterfront, the dock will consist of eight

20-ft diam barge mooring cells of steel sheet piling, each cell 43 ft above the low water line. Barge unloading machinery will be mounted on a 45-ft diam cell.

Coal barged to the plant from West Virginia will be unloaded by bucket and moved by conveyor. Another conveyor will load coke into barges.

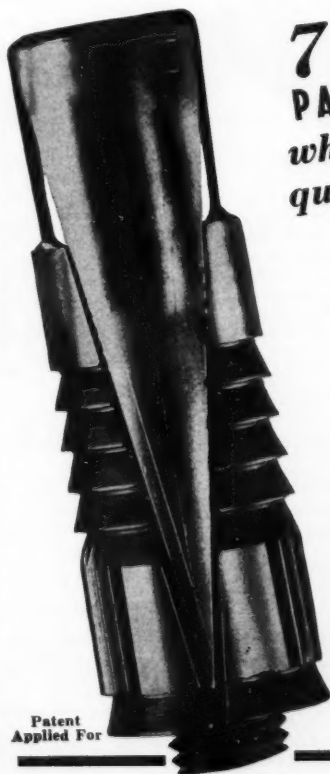
Gasoline from Coal

At the U. S. Bureau of Mines synthetic fuels plant in Louisiana, Mo., a ton of coal yields 126 gal of gasoline and more than 40 gal of other liquid fuels, plus an assortment of chemicals.

Name New Iron Mine

A. J. Cayia, manager of Inland Steel Co.'s mines and stone quarries and president of its subsidiary, Inland Lime and Stone Co., was honored recently by having the company's new mine at Crystal Falls, Mich., named after him.

The Cayia mine is two miles east of Crystal Falls, Mich., on the Menominee iron range. The shaft has been sunk to the 600-ft level and a drift at the 400-ft level has reached the ore body. Inland expects the Cayia to attain a 200,000-ton annual production.



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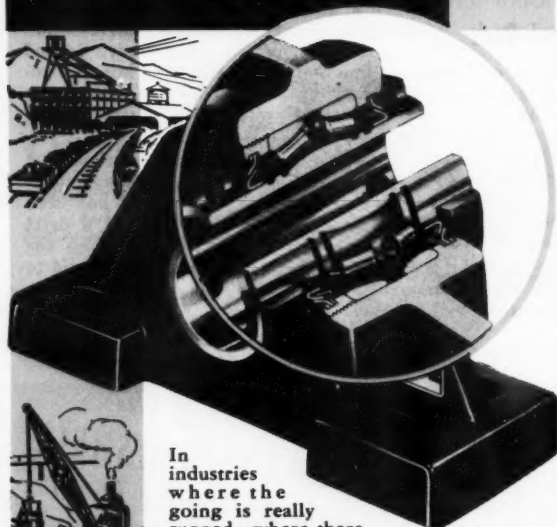
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Speed Quarry Service

Four wheels and the frame of an obsolete 1923 steam engine and an International UD-24 diesel power plant are the main components of a company designed and constructed locomotive now operating at the Lehigh Stone Co. quarry, Kankakee, Ill.

Built under the direction of Del Groff, quarry supervisor, and City Industrial Engine Sales, Chicago, the total cost of the unit, which has 16,000-lb draw bar pull at 1300 rpm, was \$16,000, approximately half the cost of a new steam engine.



In converting the old steam engine, the UD-24 was mounted on the front portion of the frame. Power to drive the wheels is provided through a torque converter to a transmission reduction gear.

Pulling 10 cars totaling 150 tons (75 tons of stone—75 tons of dead weight) it takes the engine 26 minutes to make the 1 1/4 mile round trip between quarry and crusher. Since initial tests show a cost of only \$3.00 an hour to operate against \$10.00 an hour for steam, Lehigh is converting two more units.



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Aluminum and Lignite

The nation's newest aluminum smelting plant, Aluminum Co. of America's Rockdale Works, began production November 24 as aluminum was poured from the first operating potline.

When completed, Alcoa's installation at Rockdale, Tex., will include a smelting plant with four potlines, in which aluminum will be produced from refined aluminum ore; a plant for the manufacture of carbon electrodes required in the electrolytic aluminum producing process; a power plant for the generation of required electricity; and facilities for mining lignite.

Electric power for the first two units will be supplied by Texas Power & Light Co. until Alcoa's lignite burning power plant is completed. The new aluminum plant, which will have a capacity to produce about 170,000,000 lb of aluminum annually, will be the first aluminum smelting plant in the nation to use electric power generated by burning lignite.

Before burning, the lignite will be dried by a new method developed at Denver, Colo., under the direction of V. F. Parry, Chief of the Coal Branch, Region IV, and under the sponsorship of Texas Power & Light Co.

In his remarks to a group of newspaper and radio representatives, on hand to inspect the plant, Whitel paid tribute to the role played by Texas Power & Light Co. in bringing the big plant to Rockdale. The Alcoa executive said that because of T. P. & L.'s research program, undertaken with the assistance of the United States Bureau of Mines at Denver, the potentials of lignite as fuel for the generation of electric power broadened. With the economic feasibility of using lignite for large-scale power generating purposes demonstrated, the company was encouraged to build and operate the smelting plant here.

Whitel indicated that J. G. Puterbaugh, McAlester Fuel Co., whose holdings of lignite bearing lands will provide part of the fuel required for the power plant, was instrumental in the decision to build in Rockdale.

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He found Couplings sure leak-tight
(Victaulics firmed for locking!)*

*"Ah! Victaulic Fittings, too,"
Roared the King now smiling,
"Elbows, Tees all grooved and true,"
(And Full-Flow in their styling!)
Good Saint "Vic" was in the know,
Vic-Groover tools were waiting,
Kingly smiles began to grow
(Their grooving's tops in rating!)*

*Zip! The King hooked up those sections,
Saint "Vic" did him right
With these very best connections
(No leaks and drips unsightly!)
For a Method that's complete
Wenceslaus is liking
Easiest way to make ends meet
(Victaulic's Four Star Piping!)*

VICTAULIC COMPANY OF AMERICA

P. O. Box 509, Elizabeth, N. J.

Office & Plant: 1100 Morris Ave., Union, N. J.

VICTAULIC ★ METHOD

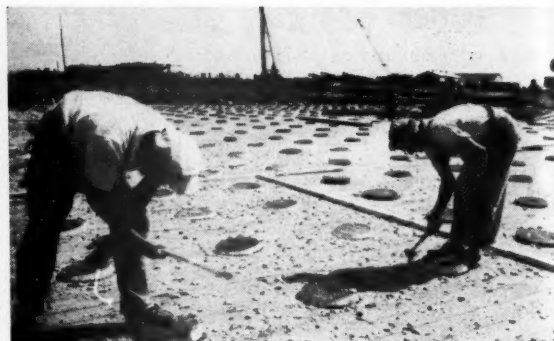
OF PIPING

★ VICTAULIC COUPLINGS

★ VICTAULIC FULL-FLOW FITTINGS

★ VIC-GROOVER TOOLS

★ ROBUST A-BOU COUPLINGS



American Frontier: 1952 Style

Where the Mississippi empties into the Gulf of Mexico the world's largest single sulphur development in 20 years is taking place. It's being built by Freeport Sulphur Co. at Garden Island Bay, La., to mine 500,000 long tons of sulphur per year. The above photo shows an early stage in construction of the multimillion-dollar plant. Before construction could begin, a half-million cu yd of fill were required for the plant site alone, and thousands of piles, 85 to 90 ft long, had to be driven for building foundations. All materials are brought in by barge. The Garden Island Bay plant, part of Freeport's \$20,000,000 development program to increase the supply of sulphur, is due to be completed around the end of 1953. The photo on the right shows workmen tapering some of the 2163 fir pilings which will provide a firm foundation for the main plant. The wooden floor will be covered by a 16-in. concrete mat which in turn will serve as support for a series of concrete cells. It is atop these cells—16 ft above mean Gulf level—that the main floor of the plant will be built

Explosion Kills Prospectors

Five of six men prospecting for uranium in a 180-ft abandoned gold mine shaft near Herron, Mich., were killed October 30 by an explosion.

Two of the victims were at the shaft bottom when the explosion oc-

curred. Three were grouped around the shaft entrance. The sixth man was saved because a small tool shed partially broke the force of the blast.

It is believed that a methane accumulation in the shaft bottom was ignited by an electric spark to cause the explosion.

Match Dual Tires to Increase Their Life

Keeping truck tire-wear at a minimum is a must for every mining operator in these times of threatening tire shortages. One of the most prevalent wastes of tires is on dual-wheel trucks where the dual tires become unmatched and one must carry twice the load originally planned for it.

Matching can be done very easily with a handy tool which can be made from scrap material. This simple tool does the job quickly.



Uniform Gauge Holes

drilled
to
over
100
feet
depth

with ROK-BIT
TUNGSTEN CARBIDE BITS,
ADAPTERS, COUPLINGS

These tools are engineered to last longer, in any formation now drilled with standard rock bits—drill faster—and keep hole in alignment. This cost-cutting performance proved in over twelve months of continuous field operation. Tools are easy to change—self-cooling and self-cleaning. Standard diameter holes—1½" and 3". Write for bulletin MCJ1252. Rock Bit Sales & Service Co., 2514 E. Cumberland St., Phila. 25, Pa. 350 Depot St., Asheville, N. C.

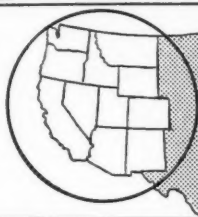
ROCK BIT

SALES AND SERVICE CO.

CARBIDE ROK-BITS • INTRA-SET DRILL STEEL
ALL TYPES OF HOLLOW DRILL STEEL • LONG
HOLE DRILLING TOOLS • HOLE-SAVERS



It consists of two strips of 2 by 2-in. lumber made to form an L shape with a metal cross brace at the joining part. One side is held flat against the outer tire side as shown in the illustration while the other side rests across the tires. In this position the inspector can see immediately if one of the dual tires is worn well below that of the other



Western States

New Mill at Crested Butte

The American Smelting and Refining Co. has announced plans for a new ore reduction mill at the old Keystone mine a few miles west of Crested Butte, Colo.

Construction of the plant at the Keystone not only would provide an outlet for the company ores, but also would provide a custom mill for many other producers in the area. Ralph E. Simpson who operates the Micawber mine, and other operators in the district are stockpiling ore in anticipation of the opening of the new mill.

Darwin J. Pope, general manager of the western mining department of A. S. & R., has announced that the plans for the mill are complete, and that construction would commence next spring as soon as weather conditions permit.

Arizona Mining Expanding

Directors of National Malleable and Steel Castings Co., Cleveland, have approved a \$2,000,000 expansion of its Capitol Foundry Co. facilities near Phoenix, Ariz., President Cleve H. Pomeroy said recently.

National Malleable, after purchasing the 27-year-old Capitol company last spring, acquired new property southeast of Phoenix at Tempe and has under construction there a large new foundry, scheduled for completion in 1953, which will produce cast steel grinding balls for the mining industry in that region.

The new program calls for adding a second foundry on the same site to produce a general line of castings for the mining industry, Pomeroy said. Among the products will be grizzly

bars, scoop lifts, chute liners, end liners, lifter bars, mantles, bowl liners, feed plates, and shovel parts. As many of these items are rapidly consumed in mining operations, there is a consistent demand for them, he stated.

"The mining industry centering around Phoenix is expanding very rapidly," said Pomeroy. "In this expansion, the production from these two new foundries will play an important part and we are going to speed their construction in every way we can."

Mineral King Changes Hands

Development of the Mineral King property north of Salt Lake, Mont., has been taken over by the Federal Mining and Smelting Co. under a long-term lease and profit-sharing agreement.

The Mineral King property consists of 32 unpatented claims, comprising old Tarbox and Meadow Mountain groups in Mineral County, Mont.

Minona Mine Dredge

Operating a dragline dredge with a capacity of 4000 cu yd of gravel daily, the Minona Mining Co., is working the Old Esperance hydraulic gold mine near Nevada City, Calif. The deposit comprises 1300 acres containing 1600 ft of gold bearing gravels in a channel between Birchville and French Corral. The property controlled by the company is estimated to contain almost 20,000,000 cu yd of gravel. Overburden and surface material were removed long ago by hydraulic mining. Minona is dredging the deeper deposits which could not be reached by the old hydraulic methods.

Ivanhoe Claim

American Alloys Metals, Inc., has completed a crosscut tunnel to the tungsten orebody on the Ivanhoe claim at Brown's Lake near Glen, Mont., and is now driving a development raise in the ore to prepare the area for mining. Diamond drilling indicates that the ore is approximately 50 ft thick in this area.

New Uranium Buying Plant

A new uranium ore buying and sampling plant is scheduled for the Atomic Energy Commission at Elgin near Greenriver, Utah. The plant will have daily capacity of 200 tons of ore. It will serve the portions of

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winning
Card!**



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C.S. Card Iron Works Co.
2501 WEST 16TH AVE.
DENVER, COLORADO



Emery, Wayne, Garfield and Grand Counties lying east of the San Rafael Swell, north of the Henry Mountains, and west of the Colorado River. Presently the nearest buying depot to this area is at Monticello.

New Idria To Expand

New Idria Mining and Chemical Co. is completing preparations for an extensive exploration and development program at its New Idria quicksilverly 6000 ft of underground workings

will be driven to explore virgin areas. The project will require two years to complete. DMEA recently approved the company's application for a loan which is to be repaid from production from new ore developments.

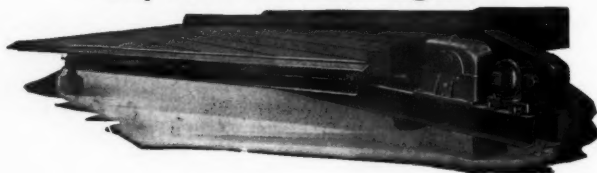
Rehabilitated about a year ago after a brief period of idleness caused by the slump of the mercury market before the Korean war, New Idria is currently producing more than 100 tons of cinnabar daily. New Idria is the largest quicksilver producer in California and has been worked continuously for almost 100 years.

New Mining Technique for Uranium

Consolidated Uranium Mines, Inc. is experimenting with a new mining technique in the mining of lenticular shaped uranium deposits on its uranium holdings in the Temple Mountain District of Emery County, Utah. Much of the uranium in the district occurs in lense-shaped deposits in the Shinarump conglomerate. These lenses are frequently located at some distance from each other, and the cost of connecting them by underground workings could in many cases exceed the value of the uranium contained in them. Plans now call for operating each lenticular deposit separately.

The Cannon Diamond Drilling Co. of Los Angeles, has already drilled four circular shafts to make accessible four different mining areas where ore has been delineated by drilling, and mining is now being conducted through these shafts with good results. Because of the circular nature of the shaft, with no disturbance to the walls, no timbering is required, and round buckets with tapered ends are being used effectively to hoist broken material from underground. Skip pockets have been cut underground in these shafts and slushers are used to convey the broken material to the buckets. Because of the fact that the formation is suitable to Calyz drilling, as much as 8 to 10 ft a shift is made in sinking the shafts. The nominal cost of around \$30.00 a foot, plus an inexpensive head-frame for hoisting, apparently give foundation to the belief that this procedure may step up the development of uranium in the Colorado Plateau. The present shafts now being operated are from 100 to 150 ft in depth, but it is believed by Consolidated Uranium Mines, Inc. that much deeper shafts of the same kind can be worked very effectively.

Why More and More Engineers

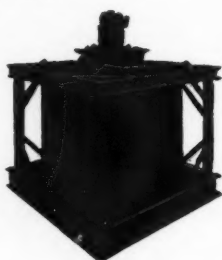


Employ SuperDuty

An engineer fully appreciates a machine that operates smoothly and efficiently.

He may have ideas of his own about whether the sharp separations he sees on a SuperDuty Table are caused by the pool riffling system, the diagonal deck design, the smooth differential action, the rigidity provided by the factory aligned underconstruction, or a combination of all of them teaming together . . . but of one thing, he is sure. SuperDuty does its work with an efficiency matched by no other table. And he goes for that.

You will too. Send for complete information and Bulletin 118-B.



CONCENCO FEED DISTRIBUTOR

The Concenco Revolving Feed Distributor is a heavily fabricated all steel machine with motor drive requiring 1 H.P. or less in operation. It effectively provides a splitting of feed into any desired number of equal portions, to serve any number of circuits or machines in battery for greater overall efficiency. Unexcelled for feeding coal washing tables.

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CONCENTRATOR
COMPANY**

**CONCENCO
PRODUCTS**

★ The ORIGINAL Deister Company ★ Inc. 1906

917 Glasgow Ave.

Fort Wayne, Ind., U.S.A.

Blue Ridge Tungsten

Blue Ridge Gold Mines Co. is trucking 25 to 30 tons of tungsten ore daily from the Hilton Creek mine to the U. S. Vanadium Corp. mill near Bishop, Calif., according to Gerald B. Hartley, president. The shaft is being repaired and a new collar set put in, preparatory to installing hoisting machinery and compressor.

Kyle-Alexander Producing

Production of lead-silver ore has begun from the Kyle-Alexander mine, west of Goldfield, Nev., operated by the Fowler Mining Co. A milling plant to treat 50 tons of concentrates daily was completed recently and concentrates are being shipped to the Bonnie Clare lead smelter of Lippincott Mines Co.

Development of the group of claims has been accelerated by building of access roads and installation of essential machinery.

Sign Mine Inspection Pact

Wyoming is the first State to enter into an agreement with the Federal government providing for the joint inspection of that State's coal mines by Federal and State inspectors. Such action was provided for in the Federal Mine Safety Act (Public Law 552, 82nd Congress) which became law on July 16 of this year.

Parkdale Plant Sold

The Parkdale plant of the Consolidated Feldspar Co. has been purchased by the International Chemical Co. The property is located 12 miles west of Cannon City, Colo.

Operated as a flotation plant before being closed a year ago, the Parkdale plant is expected to be reopened in the near future.

Crescent Mine Reopens

After a six-year shut-down the Crescent mine, located 30 miles west of Port Angeles, Wash., has been re-activated. J. E. Hopper, a co-partner in the new operation, reports that old workings are being cleaned out in preparation for the renewed activity. The property, which contains manganese ore, was shut down in 1946.

Federal Aid To Signal

Signal Mining Co. and Defense Minerals Exploration Administration have signed a contract for an exploration and development loan. The loan will be used to advance an exploration program at Signal's Hilarity property in the Pine Creek area of Idaho.

Bureau Tests Western Ores

Concentration tests made recently by the Bureau of Mines on samples from eight base-metal deposits in three western States showed the possibility of further developing mineral resources from low-grade and complex ores, according to a report released recently by J. J. Forbes, Bureau Director. The primary purpose of these tests is to find ways to treat such minerals economically.

The ore samples contained lead, zinc, copper, and antimony, or more than one of these; and some of them contained an interesting amount of silver. They included three lead-silver-zinc ores from Nevada, one zinc-lead ore from Nevada, one copper-zinc ore and one copper ore from California, one antimony ore from Nevada, and one antimony ore from Mexico.

The methods used in the treatment were gravity concentration and flotation. The report not only outlines the possibilities of treating the respective ores, but points out the limitations as well. As these ores are typical, the

information gained is expected to be useful in the future development of the districts from which they were obtained.

The report was prepared by A. L. Engel of the Bureau's Metallurgical Division, Region III, Reno, Nev., and represents a compilation of results obtained from preliminary concentration tests.

A free copy of Report of Investigations 4927, "Concentration Tests on Various Base-Metal Ores," may be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa.

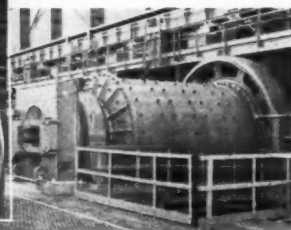
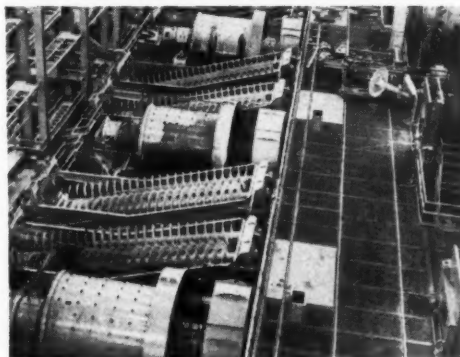
CHEMICAL ENGINEER

Large national chemical and mining company has position available for top flight chemical engineer experienced in process engineering and design. Ore dressing experience helpful. Experience must show supervisory or administrative ability. Position is very responsible one on home office engineering staff located in Chicago. Excellent opportunity in all ways, including salary if backed by qualifications. Age 30-45. Replies treated confidentially. Kindly respond giving education, experience, age and salary desired. Box 222.

at "Chuqui" too, it's

MARCY MILLS AND AKINS CLASSIFIERS

Like many other successful mining companies, Chile Exploration Company relies on Marcy Mills and Akins Classifiers for dependable mechanical operation and efficient, low cost grinding and classification.



The following M & S and CIW equipment is being used on this new installation:

10-10'8" x 14' Marcy Open End Rod Mills in open circuit for primary fine crushing, producing feed for regrind mills.

10-10' x 12' Marcy Regrind Ball Mills in closed circuit with 20-54" Akins Duplex Submerged Spiral Classifiers.

6-6'7" x 12' Marcy Ball Mills operating as concentrate regrind mills and lime mills.

Let our engineers show you the reason why so many companies choose Marcy and Akins... proved results from all kinds of grinding and classification installations.

The Mine & Smelter Supply Co.

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Offices in Salt Lake City, El Paso, 1775 Broadway, N. Y. C.
AND ITS SUBSIDIARY COMPANY

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COLORADO IRON WORKS CO.

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Manufacturers Forum

New Coal Cutting Bit

The Bowdil Co., Canton, Ohio, manufacturers and originators of the throw-away type bit have announced a new double end model after thorough mine testing. Called the "1-29," the patented shape presents a wider cut-



ting face and that surface is maintained because of the unique concave design of the bit body. A special alloy steel is used, then each bit is heat treated in Bowdil's enlarged facilities to hardnesses best suiting the customer's individual requirements. Production of the new "1-29" style is under way.

Making New Hose

Republic Rubber Division of Lee Rubber & Tire Corp., Youngstown 1, Ohio, is now producing a special type of flexible, high-pressure industrial rubber hose called Republic Wiretex.

The hose has unusual characteristics of strength, flexibility, oil and abrasion resistance, plus an ability to satisfactorily withstand effects of both high and low temperatures.

It is designed to carry various types of gases or fluids under both high and low pressures. The hose is not weakened by constant vibration or flexing and it will not rust or corrode.

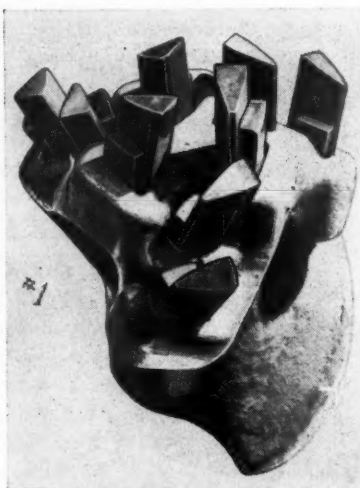
Built to withstand working pressures as high as 5500 psi and temperatures from minus 40° F to plus 200° F, standard sizes range from 3/16 in. to 2 in. for hydraulic control hose. It is also designed to meet high temperature and high pressure requirements for steam, air, ammonia and other types of industrial end usage.

For full details about Wiretex Hose to meet your requirements, write Dept. W, Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown 1, Ohio.

Easier Drilling

After several years of designing, intensive laboratory testing and more recent extensive field testing, Coalmaster has started commercial production of its new drill head known as No. 360 Coalmaster "Rocket Head" (6 1/4 in. to 6 1/2 in. diam.)

This new head utilizes nine Coalmaster Expenda Bits in an entirely new and unique arrangement. This is two more bits than any head of its size and type has ever before carried. The results achieved with this head in laboratory tests were extremely gratifying, as such simulated trials often are. The results of field tests, while they confirmed Coalmaster engineers' theories and laboratory tests,



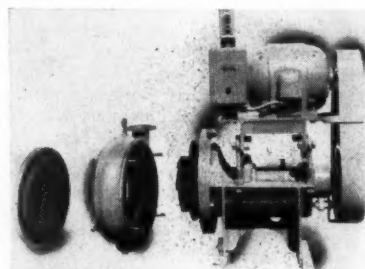
were so surprisingly successful that they were repeated to insure their authenticity.

Mine officials interested in detailed information or a first-hand demonstration of the new "Rocket Head" are invited to contact Central Mine Equipment Co., 6200 North Broadway, St. Louis 15, Mo., or their nearest Coalmaster representative.

Solve Pumping Problems

The new "Vacseal" solids and acid handling pumps are manufactured in rubber lined and all metal types in two, three, four, six, and eight in. with capacity ranges up to 3000 gpm.

These pumps operate on the patented "vacuum-seal" principle which prevents fluids or the entrained solids



from being forced into the gland. The impeller is a disc with pumping vanes on one side and smaller auxiliary vanes of a greater diameter on the reverse side next to the gland. Auxiliary vanes produce a vacuum on the shaft seal and prevent solids from cutting the shaft or packing. The pumps are therefore virtually glandless and require no sealing water to protect the gland and packing.

All of the features which enable the pump to produce suction are retained and suction lifts of from 10 to 12 ft are possible.

The "Vacseal" has many uses in the coal, construction, cement, glass, ceramic and sugar industries. The pumps handle all types of abrasive and corrosive pulps, slimes, slurries, sludges, sands, coal solids, cements' filtered residues, gravel and ash.

Rubber lined pumps have the lining vulcanized to the cast iron parts with a thermosetting cement. This type of "Vacseal" can be made acid proof by merely changing the gland bushing and installing a shaft sleeve. They are suitable for heads up to 100 ft.

All metal pumps are constructed of Ferloy iron for handling larger particles and higher heads than the rubber lined type. Heads up to 150 ft are possible.

Lining materials such as neoprene

and silicone rubber compounds are available for special applications.

A new bulletin, PB-52, giving full details, illustrations and tables on the operation, design and capacities of the "Vacseal" line, may be had on request to the Galigher Co., 545 West Eighth South, Salt Lake City, Utah.

Federal & Fawick Merge

Shareholders of the Federal Motor Truck Co. of Detroit and the Fawick Airflex Co., Inc. of Cleveland have approved the merger of the two companies by an overwhelming majority.

The surviving company, to be named Federal Fawick Corp., will establish executive offices in Cleveland and will have operating divisions both in Detroit and in Cleveland.

The new corporation will commence operations with a net worth in excess of \$5,500,000 and will have manufacturing facilities of approximately 550,000 sq ft.

Since 1910 Federal has been producing a broad range of motor trucks and special application vehicles for both on and off the highway use. Fawick has been engaged in the manufacture of industrial brakes and clutches.

The major considerations leading to the merger, as previously announced, will give Federal more diversification of products and provide Fawick with additional facilities for the development and production of new products.

The Federal Motor Truck Division will continue to operate as heretofore from Detroit and through its worldwide dealer organization.

Easy-to-see Pipe

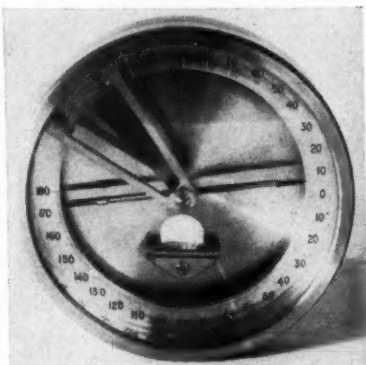
A new yellow plastic pipe which can be easily seen and quickly identified is now being marketed by The Plastex Pipe & Extrusion Co., of Columbus, Ohio, manufacturers of plastic pipe for all purposes.

The exclusive coloring of Plastex Yellow pipe has been especially compounded for maximum visibility and durability. The color, which goes all the way through the plastic material, will not fade or stain under any conditions according to the company. For mining operations, Plastex Yellow pipe has a definite advantage, since lines laid in darkened passages are easily distinguished eliminating the danger of being damaged by other equipment. Another safety feature of the pipe is that it can be positively traced and identified when used with other pipe lines or cables.

Dip Needles Available

Available for the first time in the United States are the Model D-2 Dip Needle, and the self-orientating Dip Needle, distributed by the Radiac Co., Inc., 489 Fifth Ave., New York, N. Y.

These non-electronic magnetic instruments will define for the prospector areas of high magnetic characteristics, and are particularly valuable in locating buried magnetic ore such as magnetite, pyrrhotite, hematite and siderite according to its makers. They are used by salvage men everywhere for locating pipes, sunken ships (metal),



iron bound chests, coins, iron pots, or artifacts of any kind hidden in the earth or under water.

The Model D-2 Dip Needle which gives "swing readings" was especially designed for rugged use and provides a needle system of powerful permanent magnet alloy which will retain its strength through considerable abuse. The self-orientating Dip Needle is for fast traversing where disturbing factors are not suspected to be too great.

—Announcements—

Research Corp., Bound Brook, N. J., manufacturer of Cottrell electrostatic precipitators for industrial gas cleaning has announced the opening of a new divisional office in Pittsburgh, Pa. The new office is located in the Grant Building.

Ralph A. Ostberg has been named assistant to F. S. Elfred, executive vice-president of Olin Industries, Inc. The announcement was made by John M. Olin, president.

Roberts and Schaefer Co. announces the opening of new offices in Huntington, W. Va. They will occupy Suite 303 in the Guaranty Bank Building. Richard G. Miller is district manager, and Wm. W. Blood is sales engineer located in that office.

The majority stock of the Mosebach Electric & Supply Co., 1115 Arlington Avenue, Pittsburgh 3, Pa., has been acquired by Ray Hampton and L. H. "Jiggs" Hampton. Mrs. Karl J. Mosebach, co-founder of the firm, has resigned as treasurer and chairman of the board after 27 years of service.

CATALOGS AND BULLETINS

AUGER DRILLS. *The Salem Tool Co., Salem, Ohio.* A four-page bulletin showing the McCarthy Vertical and Horizontal Drills in operation. This bulletin also shows various types of augers and drill heads, giving sizes and description for blast hole drilling and subsoil testing. To obtain a copy contact the Salem Tool Co., South Ellsworth Avenue, Salem, Ohio.

BELT CONVEYOR. *Goodman Manufacturing Co., Halsted Street and 48th Place, Chicago 9, Ill.* A four-page bulletin describes Goodman's Type 98 series belt conveyor, especially designed for shuttle car gathering in low coal. The bulletin is available upon request from the company.

DIESEL ENGINES. *Nordberg Manufacturing Co., Milwaukee 1, Wis.* Nordberg has published 12 two-color, two-page specification sheets on its Type 4FS one, two and three cylinder diesel engines. These bulletins give complete engine specifications, equipment data and outline drawings of the various engine models. These diesel engines are offered as complete, self-contained ready to operate electric generator sets, centrifugal pump units, and with clutch or stub shaft power take-off. Bulletins 208 through 219 are available, free upon request to Nordberg.

NEW BELTING BULLETIN. *Barber-Greene Co., Aurora, Ill.* This eight-page, two-color bulletin describes the company's belts. Pictured and discussed are major causes of belt failure—ply separation, carcass deterioration, irregular plies, edge wear, and longitudinal seam failure. It also includes belt selection tables and specifications of the various B-G belts. The bulletin can be obtained from any Barber-Greene distributor or by writing the company at the above address.

POWER FOR OPEN-PIT MINES. *Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.* A comprehensive 39-page book on "electric power distribution and protection for open-pit mines and quarries." Emphasizing that a properly engineered installation minimizes hazards and improves continuity of operation, this book discusses the complete electrical system for open-pit mines and quarries—from initial power distribution to maintenance of apparatus. For copy of booklet B-5447, write Westinghouse at the above address.

SAFETY EQUIPMENT. *The Boyer-Campbell Co., 6540 St. Antoine Street, Detroit, Mich.* A 144-page catalog titled "Everything for Safety" describes face shields, welding helmets, "Supersight," "Skin-Cote" liquids and creams for protecting against skin infections—safety clothing, machine guards, etc., anything required for a comprehensive safety program—a request on your letterhead will bring it to you without charge and postpaid.

WELDING INFORMATION. *All-State Welding Alloys Co., Inc., 249-55 Ferris Ave., White Plains, N. Y.* Just published is a wall chart 18 by 27 in., designed to aid welders, on the job, to select the particular All-State alloy and flux which will best serve the welding, brazing, soldering, cutting or tinning job at hand and at the least cost. Data on 41 alloys and appropriate fluxes are arranged so as to make accurate selection as nearly automatic as possible. All All-State alloys and fluxes are covered according to the metal upon which work is to be performed. Copies may be obtained from any All-State distributor and the main office.

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PUNXSUTAWNEY, PA.

Our specialty—Testing bituminous coal lands
Satisfactory cores guaranteed



CORE DRILLING

ANYWHERE

"We look into the earth"

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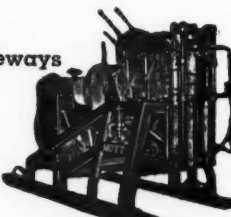
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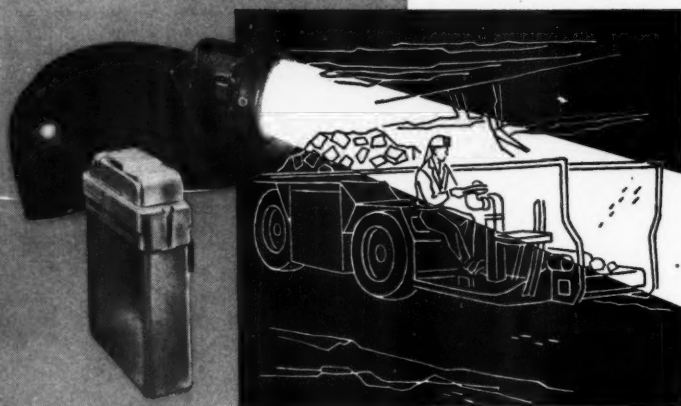
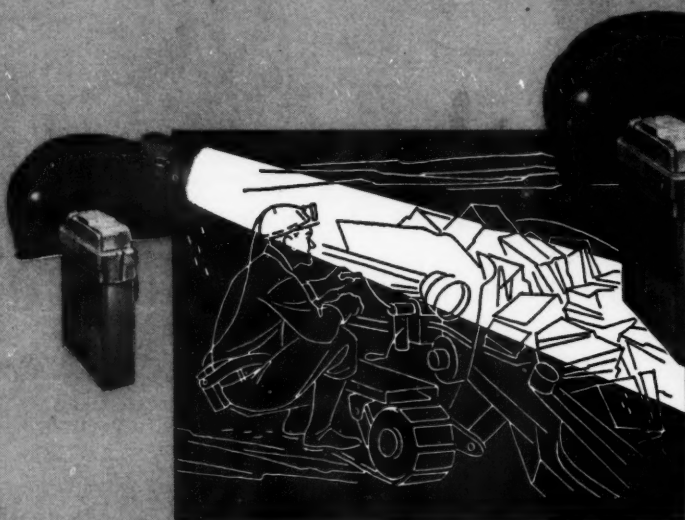


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